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by W. G. LIVINGSTON and R. C. BROWN

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Management Planning of Capital Allocations to Business Activities

by JOHN V. JAMES

PLANNING AND CONTROLLING the use of corporate capital is the basic top management function. Indeed, management is hired fundamentally to safeguard and use effectively the corporate capital placed at its disposal by the stockholders. Consequently, it is an inherent managerial responsibility to thoroughly examine each new investment proposal from two standpoints:

> First, will it properly safeguard the equity of the shareholders? Will it constitute proper stewardship of shareholder funds when measured against the principle that the only situations worth consideration are those that will increase shareholder equity over the long term?
>
> Second, since most companies have limited capital resources, does the proposed investment constitute a relatively effective use of capital? Will it tend to yield a better return on investment than do other proposals that may be available?

Recognizing its responsibility in those terms, then, management must have a framework within which proposals may be evaluated. We must make sure that the most profitable ventures have priority on the use of company capital. Moreover, we must have objectives set up as guideposts to the basic goal of utilizing capital for continued growth as well as increased earnings. In brief, we must have a capital planning program—a long-range planning program that will help management carry out its responsibility for control and effective use of corporate capital. The major considerations involved in such planning, and in the administrative framework for evaluation and control, constitute the basis for our discussion in this article.

Long-Range Planning Program

Long-range investments are the framework for the future prospects of the company. Certainly each major capital commitment should be checked for its

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profitability and consistency with some predetermined master plan, but a review of the past has to be made before we attempt to set objectives for the future. It should be revealing in the following ways.

What is the past history of company earnings? If company profits have been erratic, it is time to make a thorough analysis of each of the major operations to determine the reason for these variations. This may involve a market study by product lines, an appraisal of facilities, review of the company control programs, or evaluation of technological skills. These and many other areas of deficiency or, to state it another way, opportunities for improvement, may be pinpointed in a review of past earnings performance.

What is the return on investment? Stockholders judge management on the basis of earnings on their investment. This, in turn, is the proper yardstick for management to follow in making decisions on future investments. The stockholders are not only interested in dividends, but are also looking for an increase in their equity. If the rate of return on present investment is unsatisfactory, the problem may well be the effective use of capital within the company.

In the past few years, many companies have gone into businesses totally unrelated to their primary lines, without proper evaluation of their long-term potentials. As a result, there may be substantial investment with unsatisfactory operations which constitutes a heavy drain on the capital resources of the company. If this situation exists and is permitted to continue, it becomes a real burden for other operations, since the capital required to promote their advancement or growth is tied up.

There are many other questions that will develop in the review of past earnings performance and return on investment. Results of the review can be a significant guide to management in avoiding the pitfalls that have beset them on past investments; further, a thorough review of the past sets the stage for development of future objectives for your company.

Objectives of the Plan

The basic objective of most firms is to maximize the return on investment over the long term. To this can be added that corporate management has the responsibility to promote corporate growth, to maintain or increase market position, and to enhance and build the equity of the company for the investing stockholders. These are fine general-policy statements but they hardly provide the basis for effective review of the company's present use of capital or, more importantly, the future investment of capital placed at the disposal of corporate management.

To establish the corporate objective still does not mean a thing if these figures have not been based on studies which identify the markets to be served, the profitability and the investment required. Moreover, you must identify the steps necessary to achieve the goals. In other words, the establishment of objectives must be based on planning in depth.

What are the basic steps required to develop long-range financial plans for domestic and foreign operations? They must cover projected income and expenses, as well as the required capital (and the source of that capital) to generate the earnings forecasted and the desired return on capital employed.

Domestic Market

Although steps to be undertaken for developing the plan for the domestic market are largely dependent on the particular company in question, the general areas that must be considered in planning include:

The marketing program. A thorough analysis of the market for present product lines should be made to determine whether or not they are expanding or declining. The results of such a study have an important bearing on investment for future capital expenditures. In general, the company marketing management should be in position to evaluate existing markets as well as markets for products not presently being produced, which may provide opportunities in the future. Top management can then decide the feasibility of entering new markets from the standpoint of investment required in plant equipment, working capital, etc., compared with using capital resources in some other manner.

The research and development program. If a company is to remain competitive, technological improvements on present products must be forthcoming constantly, as well as new product ideas. The effective productivity of the research and development department and its programs is extremely important, if a company is to maintain or expand its position in the market.

The engineering program. The current and future line of products must be engineered to be competitive with respect to performance and selling features. The design features must permit manufacture at a cost comparable with competition. We are all aware of the "gold plated cadillacs" in a product line. They may be the answer to the engineer's dream but the question must be asked, "Can they be sold in competition with other products?"

The appraisal of manufacturing operations. The appraisal of existing manufacturing operations must include requirements for replacement of machinery for obsolescence; correction of inefficient plant layout (with corresponding material handling problems); basic make-or-buy determinations (such as manu-

facturing of components rather than purchasing); as well as the many other things which have an impact on company earnings and capital investment. In many instances, such an appraisal may be the solution of problems of maintaining profit levels in a highly competitive market. We frequently need to be reminded that while the real fixed-capacity costs are not readily adjustable to the cyclical fluctuations of business, the majority of costs can be controlled and adjusted.

Every effort should be made to increase the profit margins on products. To achieve this goal the program must include review of individual products within the line to determine whether production efficiency can be improved. Further, control of costs of labor and material must be obtained and, more importantly, improvements programmed on a definite time-schedule to maintain technological progress and our competitive position in the market.

Working assets. When the above steps have been completed and programmed on a definite time-schedule, we are then in a position to review and evaluate our current-asset investment as well as future requirements. If our analysis has disclosed opportunities for simplification of product lines, standardization of components or sub-assemblies, then these changes should be reflected in the inventory program and planned future requirements for capital. The review of current and future usage of fixed assets, such as planned utilization rates of plant, equipment, etc., can also have a major bearing on our future capital requirements. This may also be a *source* of capital if our review discloses opportunities for disposal of assets by elimination of product lines.

Asset abandonments. If some phases of the business have been determined as unprofitable, study should be made of the procedures to be used in divesting these interests. Certainly, if an operation is a constant loss situation, any capital recovery that can be obtained through its disposal, and which can be reinvested in some profitable venture, is much more practical and profitable than the continued dilution of earnings.

What about acquisitions and mergers? The acquisition of or a merger with another company should be considered on the same basis as any other proposed capital expenditure. While this is frequently a much faster way to enter new markets, review of the estimated return on the investment, based on projected future earnings, may show the return to be inadequate and stockholders' equity jeopardized or diluted.

Foreign Markets

The complexities of the foreign markets are frequently quite different from those of the domestic market, due to widespread differences in wages, import

duties, currencies and tax benefits. In general, the following elements must be given special consideration.

Where to locate. A careful study must be made by products and markets in foreign countries to determine where to locate additional investment in manufacturing so that our products will receive the best acceptance. Analysis of product profitability is a must. Further, political risks, which affect the relative stability of the currency, must also be critically evaluated. What may be a highly profitable item in one country may not be appealing in some other, owing to competitive pressure, tariffs, etc.

Decisions regarding manufacture or licensee arrangements. In progressive foreign countries, mass production is increasing at a rapid rate, with a corresponding increase in wages, a major factor in the profitability of operations in the past. Local participation in foreign manufacturing operations is almost a necessity in many countries if they are to succeed. This, in turn, prohibits domestic management from exercising full authority over policies and capital of the company. While licensing foreign companies for production of our products frequently minimizes the risk involved, it also provides a source of potential competition in the future, which must be carefully evaluated.

Tax considerations. Due to the lower tax rates in foreign countries, and virtually no taxes in the United States on income earned abroad, many companies have substantially enhanced their profits over the past decade. However, the future tax benefits may be less appealing if the United States starts taxing a major part of corporate income earned abroad.

The Availability of Capital

Although our basic purpose here is to discuss the allocation of capital, we should bear in mind that our review must also consider the availability of required capital.

The flow of capital, generated internally through depreciation and retained earnings, will depend upon management policy with regard to dividends and "flow-back" or reinvestment of earnings. Raising capital externally also involves cost factors and a possible dilution of future earnings. The cost of capital obtainable through external financing should be of great importance in determining the advisability of proceeding with major new projects, for this sets the minimum return required to maintain stockholders equity. This is also one reason that long-term leasing commitments deserve the same searching review that other capital proposals require.

The Master Plan

To summarize, then, the management planning of capital allocations must start with the establishment of specific corporate objectives based on planning in depth. And such planning must consider the specialized problems of both domestic and foreign operations.

Review must be made of: marketing programs, research and development programs, product engineering programs and manufacturing operations. The impact of such review on current and future utilization of existing investment must be considered and the potential benefits of asset abandonment appraised. The prospects offered by acquisition or merger must be carefully evaluated. With respect to foreign markets, consideration must be given to the particular problems that arise in wages, import duties, currencies, taxes and political risk. Finally, our master plan must consider the availability and cost of required capital.

Having the review completed on such a basis, we can:

1. Determine what we can do.
2. Establish corporate objectives and plans to achieve these objectives.
3. Evaluate our various investment proposals.

If our profit planning has been done in depth and encompasses all major phases or facets of the business, including not only income and expenses but capital requirements as well, we can proceed to screen and evaluate the capital proposals in line with the funds that are available.

The Allocation Process and the Administrative Framework

Most capital expenditure proposals in any company fall logically into rather well defined categories. These generally are:

1. Essential replacements—such as repairs to tooling and equipment that are necessary for continuation of the business.
2. Machinery replacements to improve efficiency and lower costs.
3. Expansion projects for new or improved products or processes, which have as their goal an entry into new or expanding markets, or major changes in the manufacturing process.
4. Strategic investments involving expenditures for improvement of safety conditions, employee goodwill or morale, public relations, or some categories of research and development and general administrative functions.

Depending upon the company and the magnitude of expenditures, these can be further divided in other sub-classifications. Generally, within these major classifications, however, the acceptable or minimum rate of return required for approval varies significantly.

Expenditures for replacement can usually be evaluated with more certainty, since there are fewer unknown factors, than those expenditures concerned with new products or processes. Consequently, acceptable rates of return for replacement projects are lower than those for projects involving new products or new processes.

Capital requests are generally submitted as part of the profit plan program. Detailed budgets listing additional requirements for working capital and/or equipment and facilities are part of the supporting detail for the plan. Generally, approval is based on the following:

1. Essential replacements. These are usually approved if necessary to continue the product line or essential to maintain the business. Ordinarily, any expenditure which results in lower rate of return on capital should be thoroughly screened.
2. Machinery replacements should, as a rule, improve the rate of return on capital. If the replacement does not improve the return, it should be carefully scrutinized.
3. Expansion or growth projects should be evaluated as to the return over the economic life of the project. The factor of risk, as measured by the recovery period for capital employed, should be carefully reviewed. Generally, to be acceptable, such projects should improve the existing rate of return.
4. Strategic investments not capable of measurement. In this category are office buildings, research laboratories and the like. Such expenditures should be carefully reviewed to ensure that the intangible benefits derived are as valuable as the return available by the employment of this capital in other parts of the business.

Although there are many methods available for evaluating or calculating return on projects, in our company we basically employ two factors:

1. The payout period or time required to recoup the investment. This time-period, we believe, gives an excellent indication of risk involved in recovering the expenditures.
2. Rate of return, as calculated by discounted-cash-flow techniques. This discounts future earnings to their present value. Since an investment made today is the purchase of a series of future incomes or earnings, which compound in value throughout the years, we believe this method to be best for measuring earnings over the economic life of the investment.

Our plan for administration and control, then, is based on recognition of the risk classes mentioned and embodies the two evaluation factors, payout period and rate of return on investment. Most plans for administering the allocation of capital expenditures include the following tools:

1. Capital budgets which establish the scope, nature and extent of the next year's program and long-term requirements.
2. Appropriation requests for review of specific capital expenditure proposals, beginning at the department level and moving up through the hierarchy of management—sometimes even including the board of directors.
3. Progress reports on approved but uncompleted appropriations.
4. Post-completion audit of company capital projects.

Capital Budgets

Capital budgets provide management with answers to three important questions:

What are the total capital funds the company will need during the coming fiscal year?

When during the year will these funds be needed?

How will these funds be spent?

The major advantages from the use of a capital budget are:

1. It forces staff and operating personnel to look ahead, thus helping to assure management of a modern plant and efficient equipment and reducing the chances that profitable opportunities will be missed.
2. It also enables management to review projects in terms of relative need and value and so assign them priorities in keeping with the company's limited resources.
3. It assists management in forecasting the company's cash needs.

In our companies, budget data is generally assembled from one to three months prior to the close of a company's fiscal year, in order to allow adequate time for review of all requests. There are three aspects to the reviewing process; the budget request is analyzed (1) in terms of the merit of major individual projects, (2) in terms of its relation to the company's over-all operations, including its long-range objectives and (3) in terms of the company's available financial resources.

The budget is revised on a quarterly basis to allow for changes in economic,

competitive and other conditions. In this way funds tabbed for projects no longer regarded as advisable are made available for new projects.

Review of Capital Proposals

To establish a uniform method for assembling all the pertinent facts concerning proposed investment of capital funds, companies with capital control systems generally employ one or several forms for capital expenditures, authorizations, supplemental requests and cancellation or change in projects.

Authority for expenditure forms are designed to: describe the proposal and its purpose; show the estimated cost of the proposed project; reflect the project influences on operating costs and profits and return on investment; provide data on any equipment to be replaced; serve as a medium for obtaining necessary approval. *The supplemental request* form is generally similar to the authority-for-expenditure form. In our companies, supplemental requests are necessary when the cost of a capital project exceeds the original appropriation by 10 percent. The *project change notice* represents a new request which must be filed when an important change is made in a capital project. Its purpose is to (a) tell why the change is being made, (b) secure approval of the proposed change, (c) notify interested parties.

While capital expenditures can be generally requested or proposed by anyone in any department at any time, requests usually originate in the plant manager's office. He customarily draws upon his entire staff for assistance but the sales, engineering and accounting departments are the principal sources of information for assembling data on proposals. The request, when properly formulated, is usually submitted to successive levels of management for approval, up to and often including the board of directors. Because capital requests are so numerous in larger companies, top management does not have adequate time to review all of them. As a result, many companies, such as ours, have established limits of authority which permit various operating executives to pass final judgment on certain types of expenditures below stipulated amounts.

Progress Reports; Post-Completion Audit

Progress reports inform management whether funds are being spent for the purposes designated, according to schedule, or are likely to prove inadequate. A typical progress report shows the amount appropriated, the amount spent and the balance on hand. Often a time-table of cash needs is given.

Progress reports are usually prepared in the accounting department under

the guidance of the controller, on a monthly basis. They are ordinarily sent to all persons who are responsible in any way for a project.

Because a post-completion audit requires extensive research, relatively few companies use this check. Those who do, believe it provides a valuable guide for future projects, as it reveals the technical, engineering, and costing faults of past projects. These audits in our companies are usually restricted to projects over a specified dollar amount and are not normally started until at least one year following the completion of a project.

Making Capital Controls Work

There are a few basic considerations that should be observed in any capital control program, among which are the following:

INTRODUCING CAPITAL CONTROLS

1. Educate everyone concerned, in control procedures and objectives. Written manuals on policy and procedures are a major aid.
2. Do not make control objectives too rigid at the start. Controls can be tightened later.
3. Encourage suggestions for improving procedures.
4. Do not introduce all controls simultaneously; it usually is not necessary.

MAINTAINING EFFECTIVENESS OF CONTROLS

1. Proposals should be viewed in terms of the company's long-range program as well as its immediate needs.
2. Continuous coaching is necessary to ensure accurate and prompt compliance with instructions.
3. Adequate research must be done on all capital proposals.
4. Optimism, particularly with new projects, must be taken into account.

In addition to the projects post-completion audit for measuring performance of new capital ventures, we continuously measure the effectiveness of the use of capital on these bases by company, by division and by product line.

We have little difficulty in determining the capital employed by company or division or in accurately measuring capital turnover. Naturally, we also realize that we cannot expect capital turnover rates to be maintained when asset volume levels fluctuate significantly. In brief, we recognize that certain elements of capital, such as base inventory stock, investment in plant or equipment, etc.,

can materially affect capital turnover rates. Established target or budget rates for capital turnover are, therefore, based on the sales volume levels that are anticipated for divisions or companies. Performance is measured on the same basis. In divisions where the management personnel control only a portion of the capital placed at their disposal, we measure the performance on that portion of the capital which they do control, or for which they are responsible.

We believe it is extremely important that capital investment also be controlled and measured on a product line basis. In order to properly evaluate product line performance, we must give consideration to the total investment. Whether part of it was expensed as research and develoment or as pre-operating expense, does not alter the fact that such expenditures represent an investment similar in practically every way to the fixed assets and working capital employed by the product line.

When new capital proposals are involved, we particularly see to it that those expenses are included as part of the investment base, so that rate of return can be measured and controlled on a total-program basis. It may be noted that major expenditures of this type are classified as growth projects and are given consideration in calculating target or budget rates of return for operating divisions or companies. It will also be noted that in our discussion we emphasize that responsibility for effective use of capital must be assigned in fashion similar to that employed for responsibility for control of income, expense or profits. In short, requests for capital which embody claimed savings or improvements are, to the extent possible, assigned to one person who is responsible for the use of the capital and for generating the required return.

A Pre-Requisite for Company Progress

Long-range capital planning is an absolute necessity for any company that is to grow successfully. To stand still is, in effect, to go backwards and, no matter how small or large a company may be, it must continue to push toward a goal of continued growth and increased earnings.

Accomplishment of that purpose requires the establishment of objectives and the design and use of a master plan for long-range growth purposes—the road-map required for progress. It is the required guidepost to permit management to compare the future projections of the company with the current progress being made. For growth to become a reality, management must initiate action on a time schedule which will direct capital into the projects that raise the over-all return on investments. This is the only sure way to reach management's goal of maximizing return on investment.

Now—The Effect of Auditing on EDP

by ROBERT G. SWARTZ*

AFTER HAVING READ the fine article by Frank J. Curka in the April 1961 *Bulletin* on "The Effect of Electronic Data Processing on Auditing," I cannot help but speculate about the reverse influence—what effect has auditing had on EDP? It would seem that there have been four effects:

Improved internal control. One of the benefits of auditing is to provide a form of on-the-job training in internal control to business personnel. The fact that many EDP installations demonstrate good internal control is particularly due to pressure and encouragement by auditors.

Preservation of interim results. In many cases, punched cards and tape reels containing interim results have been preserved specifically for possible audit review. This frequently is beneficial to the business for protection against minor fire hazards, as well as improved internal control.

Self-checking circuits in business computers. Mr. Curka discusses features built into electronic computers to check the accuracy of the machines themselves. Interestingly enough, one of the most widespread types of automatic checks in business computers—internal parity checking—is not found generally in scientific computers. This is not to suggest that computers for scientific purposes are less reliable, but there is a definite demand, partially "to satisfy the auditors," for installation of more expensive self-checking circuits in business computers.

Acceptance of EDP by management. One of the effects of EDP has been growth of management advisory services oriented toward EDP, offered by public accounting firms. Another effect has been the concern of internal auditors with possible EDP applications. This new area of interest by auditors, which has come about due to the growth of electronic data processing, has in turn probably quickened its acceptance by accounting and financial executives and has smoothed the transition of simple punched card installations to electronic computers.

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Why Measure Return on Capital?

by W. G. LIVINGSTON and R. C. BROWN*

THE USUAL PLATITUDE associated with return on investment measures, "How to make money in business just by figuring return on investment," will find no further mention in this paper than the one just given it. I would like to approach the topic in a more realistic manner. First of all I would like to phrase the question another way: "Why (bother to) measure return on capital?" We can start our answer by pointing out that one of the prime jobs of accountants is measurement. However, it should not be done at random. Accountants will need to show that any process of measurement on which they embark is worthwhile, i.e., that:

1. Its contribution is worth the cost.
2. Complexity or "fineness" of measures is justified by their use and significance.

Definition of Terms

Before applying these considerations to our "why bother" question, let us define our terms and language:

1. *Capital* is the source of funds for running the business. It may be secured from three major sources, through a variety of means—equity (contributed by owners), debt (advanced by lendors) and current liabilities (normal short-term creditors).
2. *Investment* is the use to which capital obtained from such sources is put in a business. These uses, generally, are for: plant and equipment, property (so-called "fixed" investments), inventories, receivables, working capital and operating cash.
3. *Income*, in broad terms, is the profit generated by the business. It

* *Note*: This paper, jointly prepared, was presented at the Annual Conference by Mr. Brown.

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means different things to different people. Operating income is profit resulting from operations; book income is net income per statements, reflecting tax, asset and financing considerations as well as operating results; owner's income is what he takes from the business, normally dividends.

Accept for the moment the premise that with such a latitude in the definitions, components can be put together in a number of ways, yielding different measures for different purposes. We will come back later to the theme that they give us a toolbox of measures.

Skeptical Questions—and Pointed Answers

We return now to the "why measure" question. Let us test ourselves and see if we can answer questions that some managers might ask about our techniques and their application to the business. Let us pose some questions that others might ask, first of all, about capital. Suppose we are confronted with five different managers, each of whom asks one of the following questions:

1. I have no fixed investment; all of my assets are liquid. What can return on investment do for me?
2. I have no investment; all capital in the business is in cash. Why bother with any measurements?
3. All of my investment is in inventory and receivables. How does return on capital apply?
4. All of my investment is in working capital. How can return on capital be useful here?
5. My investment is entirely fixed. Since these are "sunk costs," why worry?

Secondly, suppose we faced a similar set of questions from different managers concerning the area of income, as follows:

1. I am making plenty of money. Why go to the trouble of measurement?
2. I am showing no profit. How can I have a problem of measurement?
3. I have a tax loss carry-forward; I will not have to pay taxes for five years. How can return on capital be important to me?
4. My financing expense is heavy; my problem is debt service. How can you help me?
5. Profits in my business are marginal. What good can measurement do me?

The men who have asked us to justify our existence have posed some tough questions. Granted, these may be extreme questions, but how would you answer them? Let me suggest some possibilities. First of all, consider the questions in the capital area. For the man who argues that he has no fixed investment and that all his investment is liquid, we would suggest to him that the problem is not the degree of "fixedness" or "liquidity." The pertinent question is the size of the investment in relation to the business. And this measurement—to some extent—must be in terms of its need.

For the manager who indicates that he has virtually no investment, since most of it is in cash, we would suggest to him that all money, even the gold in Fort Knox, is measured in terms of its usefulness. No prudent manager or investor lets money sit in the "mattress" when it could be producing interest, return or dividends. Idle money or capital in any form is almost as serious a managerial sin as too little money or money poorly invested.

As to the man who says that his money is in inventory and receivables, in good stock and good customer accounts, the question is not whether the value is there, but whether it is appropriately invested in these items. Our concern here is, again, with the size of the investment, whether or not it is commensurate with the volume, scope and profitability of the business.

The man who argues that all of his investment is in working capital may be proud of his high, current ratio, but neither the size of the ratio nor the amount of working capital is an appropriate test of his conduct of management. A tight working capital position may be indicative of either a tight-fisted manager or of a capital-starved business; an ample working capital position may be symptomatic of a well-hedged position or idle cash.

Finally, let us consider the manager who argues that all of his investment is in fixed assets and none in working capital. He thinks the pertinent fact is that this is "sunk" cost. He says, "It is what somebody else did, and I am just stuck with the job of running the mess." The question here should be one of whether the business can utilize this investment productively and profitably, not merely to recover the investment and pay off those from whom the money was obtained but also, and more importantly, to attract new capital for the future.

Now we will go over these relationships once more, thinking not only of capital but likewise of income to be derived from it. Our first manager says, "I am making plenty of money. Why bother to measure income?" What may be large in terms of profit amount, or even significant in terms of margin on sales, may be Lilliputian in size in comparison to the investment required to attain such sales volume or profit level. No matter how high the profit position is, or how high a rate of return on capital the business has, every manager must gird

himself for defense against the deterioration he knows will occur in the future. He must constantly seek new ways of bolstering his return on capital and must be able to evaluate the effects they promise or yield.

For the manager who says, "I am not making any money at all," the question is, of course, why no profit, and how it can be obtained. Can a significant level of profit be obtained in the future or should the business be liquidated? Application of rate of return to different facets of the company operation will disclose areas which are more heavily invested than others, areas with lower turnover than others, and also areas which show low profit margin. Where all three of these pertain, they are repressive factors to the profits of a company.

The manager who says he has a big loss carry-forward and will not need to pay taxes for five years seems to think that he has no problem of profits or profitability. However, the advantage, if any, offered by past sins, although they may somewhat alleviate toils of the present, will not mask the real facts of commercial life. Every business must show an adequate rate of return sometime, even after paying normal taxes. As there is a statute of limitations on loss carry-forward, there is also one on investors' patience.

For the manager who says, "I am doing all right on operating profit, but financing expense is heavy, and I do not show any margin below the line," we can demonstrate that the business is either making an appropriate return on capital, measured in terms of operating profit, or it is not. The ability of the enterprise to handle its debt service in covering interest cost and in meeting principal repayment, is a problem of financing. In the long run, any enterprise must show an adequate operating return on investment, no matter what the sources are. It must, obviously, cover its debt service as well. What may at first blush seem to be an operating problem may be, largely, a financing or capital structure problem. Each of these requires a different kind of treatment and solution.

Then there is the manager who says, "Profit is marginal, what I need is help, not measurement." I think we could state that return on capital would show him where his capital is employed more productively and more profitably than the average. Through looking at profit margins and turnover by plant, division, product group and other facets of the enterprise, we could assist him in pruning, bolstering, cleaning up, spinning off, and re-directing this growing organism that is his enterprise.

Common Ground for All Parties at Interest

Through all of this runs a thread common to each of the company situations dealt with.

First of all, in each case, we find that we have to concern ourselves with not only the source from which capital resources are obtained but also their investment application, and the uses to which such investment is put. Secondly, we are faced with the need for measurement of adequacy, appropriateness, or size of either capital sources or investment uses. Thirdly, we find that the ultimate test of size and adequacy lies in relating investment to profit.

Again, we have found that no matter whose side we take, the investor's or the manager's, in broad, over-all terms their attitudes must be alike in viewing the profitability of the business, the logic of its capitalization, and its investment. The investor may be primarily interested in interest, principal payment and dividends. The manager may be interested in salary, stock options, executive perquisites. Such short-term interests must, in the long run, be subordinated to the basic yield on capital utilized; what may appear to be a conflict of interests must ultimately be resolved in the marketplace for financial resources.

In short, then, we find that we measure return on capital not because we want to, think we should, or because "it's done," but because we have to. It is the only way for divergent interests and unrelated aspects of a business to be brought into common perspective. It is the least common denominator. Return on capital may be different in application and not necessarily uniform in definition. Our measures are imperfect at best. However, the fundamentals of the concept provide an acid test of both manager and investor alike. We find, then, that we cannot run a business without concern for, and knowledge of our investment and return on capital.

The Main Point in Management

I think we have shown why return on capital is a useful significant measure in each of these "why bother" arguments, whether for capital or for income. And I think we have also demonstrated that measurement of profitability of the business must be related to the capital employed. Return on capital is a fundamental concept; its use universal. The capital of a business is initially money. Financing the business depends upon obtaining and utilizing all sources for financial backing.

The means of securing what it takes to produce is, initially, through money—financing. These capital sources are limited by nature, political machinery and the philosophy of the investing public. In the last analysis, in competing for these resources, no matter how mitigating circumstances may be, the investor or manager is measured in terms of the kind of yield he gets on these resources.

If the yield is good and commensurate with the risk, it is obvious that, eventually, additional resources can be obtained. If on the other hand this proves untrue, additional resources may be either very expensive, or even unobtainable. The investor faces a series of alternative media for investment and each manager competes for his source of funds with these alternatives.

Using the Concept to Meet a Challenge

At this point, I would like to express a growing concern for where efforts in measuring investment return are leading us. I would like to quote from an article written recently by Cameron Hawley, titled "Needed: More Tough-Minded Leaders in Business."[1]

> "Our American industrial system is challenged today as it has never been challenged before. Not only do we face the economic competition of the Communists but, in an era of freer and freer world trade, we are even more seriously threatened by our friends. . . . I cannot escape the conclusion that the typical American corporation is in no condition to stand up to this kind of competition.
>
> "Fogbound one night at the airport near Amsterdam, I was chatting with the president of an American company. . . . He had just concluded, he told me, a manufacturing agreement with a European firm. As many another U. S. businessman is learning, he had discovered that the way to beat high costs at home is to transfer production plants abroad. But the reason for the foreign advantage is not what he had anticipated.
>
> " 'Until I got on the inside,' he said, 'I thought they had us licked over here because of wage rates. I know differently now. For every penny they're saving in direct labor costs, they've got us whipped by three cents in general overhead. Inside the plant, it's about a standoff—but when you get to the office, they make us look like fools.'
>
> "His company and this European firm are about the same size in terms of units of production. The American company has about 1200 hourly workers in its plant, the overseas factory 1300. But in terms of salaried employes, it's a different story—912 in America versus 221 in Europe. *There's* a clue to our basic disadvantage in foreign competition today. Here in the United States we have the most expensive industrial management on earth.
>
> "It starts right at the top. The American firm mentioned has an active chairman of the board, a president, five vice presidents and an executive staff of forty-two people. The European firm is run by a managing director and one key assistant. The top-management staff totals only

[1] *Readers Digest*, February 1961, adapted from a paper first delivered at the Personnel Conference of the American Management Association in Chicago, 1960.

nine. The contrast continues right down the line. 'They could pay our wage rates,' the American president said, and we still couldn't compete—our overhead would lick us hands down.' . . . I wonder how we got so far off the beam."

Corporate, divisional and plant accounting staffs are a part of the "overheads" Cameron Hawley writes about. Like many other staff groups, accountants have taken too much for granted and built their own "empires." In this age of increasing complexity, expensive computers, electronic data processing, many measures and new techniques (operations research and discounted cash flow, for example), I think it can be useful for us to pause and reflect. With the squeeze on profits which exists today, and which is bound to continue, accountants will have to justify their existence.

Let me quote from Cameron Hawley again[2]—

"At first 'enlightenment' means only a heightened social conscience. Fairly quickly, however, the definition was broadened. . . . If the Old Man was dictatorial and autocratic, we enlightened businessmen would bring democracy into the world of business. Thus, the committee system of operation came into being—and the top executive became a sort of super committee chairman. . . . Keeping everyone happy and contended became a prime goal of business management.

"Thus was formed the rounded image of the ideal corporate executive—quiet, even-tempered, democratic, one of the group, a man who led by soft persuasion, a compromiser, a man who never ruffled tempers or hurt people's feelings—in short, a man whom everybody *liked*. It is the image of the 'nice guy' we still worship in this era when 'getting along with people' is counted as the most important talent a man can possess.

". . . The professional business manager has every inducement to join the 'nice guy' cult. The trouble is that he has to be a nice guy to many different people, all of whom have their own special interests. He must not only keep his co-workers happy—he must also keep earnings high or the board of directors won't like him. He must keep the price of the stock going up to please the investors. He must placate the union to avoid strikes, carefully nourish useful friendships in Washington and the state capital, exert his charm on dealers and distributors—there's really no end to it.

"Professional management tends to encourage bureaucratic corpulence. . . . The Old Man of my youth was a G.P.—a general practitioner. Unless it was something too serious, he did the job himself. Not today. Now you set up a clinic—economists, market analysts, statisticians, methods experts, legal advisers, etc. Then you need more experts—organization specialists—to find out (after careful study, of

[2] *Ibid.*

course) who is supposed to do what, and the proper procedures to get them to do it without making someone unhappy in the process. So the bureaucratic fat gets thicker and thicker, growing by a process of cell division.

"I don't think we can go on indulging much longer in the luxury of hiring ten men to make one man's decisions. We have too often lost sight of the vital importance of *vigorous, dynamic, personal leadership.*"

The single, most important test of *executive leadership* is not the way in which the manager uses resources with which he has been entrusted but the *yield* on these resources obtained for those who made the original investment. For example, if a business borrows all its money (from which it is to operate) in the form of long-term debt, it must show sufficient earnings (before taxes) to cover the interest. It must, in addition, show sufficient "cash flow" to retire debt in a reasonably satisfactory period of time. Regardless of the source, this basic test applies. There is no place in the management of a business where the individual qualities of leadership, character and direction show up more clearly than in the attainment of financial resources and their use, not only for the benefit of the company but also for the benefit of the capital contributors.

It is immediately apparent that there are various ways of looking at "capital" and "return." It depends upon where you sit and who is judging whom. It must, by now, also be apparent that there is a different kind of measurement of return on capital required for each orientation viewpoint and use. I would like to suggest that you not let this bother you.

It may seem complex—right measure, engineering handbook, etc.—each time we sit down to appraise. However, I think you will find that there is no one measure that applies equally well to every use, and that there is only one appropriate measure for each use. Look carefully, and you will find that use. A good accountant will fit his work to the appropriateness of the situation required and present his results in such a way that the answer is clear cut and undefiled by mechanism.

Let me offer a final quotation from Cameron Hawley's article:[3]

"There is an old saying that every great organization is the lengthened shadow of one man. Dig into the history of any company. Some man—an individual, not a committee—had a dream, and that one man turned that dream into a reality by fighting, by exercising the kind of single-minded leadership that drives through a goal no matter what the obstacles may be. In the process, no doubt, he ruffled some feathers. But he got the job done.

[3] *Ibid.*

"The quality of leadership is the determining factor in every institution that makes up our society. Whether it's the PTA, a country club, or a church, if you have the right person heading it up, it gets some place. If you don't, it doesn't. If you don't have leadership, you can appoint committees and draw organization charts and make speeches about cooperation until you're blue in the face, but nothing happens. Leadership is a personal thing, inevitably focused in one man. . . .

". . . It seems to me that we've wandered a long way off the beam, and I think we're going to pay a price for it. I know of a dozen companies that are in the process of executive reorientation right now and for every one I know about there must be hundreds that are quietly working toward the same end.

"The tide *has* turned. A new image is being cast. We're setting up a new prototype for the ideal corporation executive, a new model to follow. And it *is* new. We're not going back to the Old Man who went out with the Depression. We can't. This is a new world with new demands. But we must relearn and reapply one truth that has been evident through all ages and all social systems, and will continue to be a truth as long as man remains a human being; the perpetual need for the invigorating and vital force of personal leadership."

An Affirmative Conclusion

I would like to offer a quotation from a friend, a book reviewer. He suggests that we not be persuaded that "what isn't good for *everything* isn't good for *anything*." Does this seem to argue for fancy technique, the need for computers, and the need for large staff? I hope not. The answers are relatively simple, can be determined quickly by a skilled accountant preparing an answer on the back of an envelope, and with a six-inch slide rule, perhaps. The knowledge of fundamentals and the strategy of application are far more important than a handbook of tables.

At the beginning of this paper I may seem to have poked fun at the thought that the return on capital measure is a built-in do-it-yourself kit and the accountant's job is to measure return on capital, please the boss, make money and retire early in this way. I do not really intend to poke fun, and I really think and commend for your consideration that this really *is* a personal "do-it-yourself" kit. I would like to suggest also that it depends upon each accountant and his individual attention, application, and approach to the problems of his business.

In conclusion, having come around the barn and met, I hope, the negative point of view, it is an absolutely essential fact of business life that measuring return on capital is necessary to an understanding, direction, and evaluation of

the business. Lack of understanding of the principles of these applications can ruin a management or an accounting department. If, in the battle of overhead costs, I must give up my computers, my economists, my market research men, and my cost men, then let me stand alone with a slide rule and the rate-of-return concept, and I am fully prepared to meet all comers on any terms.

Using Internal Audit Findings Wisely

by JAMES A. CARASIMS*

THE ARTICLE by Lawrence C. Richards ("Current Concepts of Internal Auditing," *N.A.A. Bulletin,* April 1961) presents constructive concepts that will contribute to the successful and efficient operation of any company in which they are applied. However, the very nature and objectives of internal auditing present certain difficulties that, unless they are recognized, will minimize the effectiveness of these concepts.

First, both the auditing activity and top management should use caution in selecting matters to be considered deviations and included in the final report. This caution should extend to the method followed up for correction. It must be remembered that, in many areas, auditing represents "Monday morning quarterbacking." What on the surface may appear as a serious dereliction, may well turn out to have been a well-advised transaction: (1) if the facts are viewed as they stood at the time the decision was made and (2) if an appreciation exists of the risks inherent in operating decisions. For this reason, the auditing activity should be sympathetic in the manner in which deficiencies are reported. Top management should review the report with similar tolerance and in the follow-up, if any, should recognize the operating situation. To do otherwise, would perpetuate the all-too-ready misconception in the minds of operating personnel that the audit function is primarily an impersonal police action that is borne with only because of top management's insistence upon it.

Second, if top management and the auditing activity demand absolute adherence to company policies, paperwork, and measurable standards, then operating personnel are likely to follow two detrimental courses as a consequence: (1) devote more time to seeing that the "i's" are dotted and "t's" crossed, thus diverting attention from the more essential operating problems and/or (2) "play it safe" and hesitate to make the operating risk decisions necessary in all successful companies. When either of these developments takes place, the auditing program, instead of creating a successful climate, has become a stultifying force. However, if these two obstacles are avoided, the concepts expressed by Mr. Richards can be very helpful to management in managing.

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The Development of Auditing Standards and Techniques for EDP Systems

by RICHARD S. WOODS

THE PUBLICATION of Felix Kaufman's recent book on auditing and electronics[1] formalizes the importance of a specialized subject area of enormous significance to accountants and auditors. It is the second of two milestones in almost a decade of auditing literature related to electronic systems. The first was a summarization of literature to date compiled by Mr. Goodrich C. Cleaver in 1958.[2] Each of these sources is impressive and useful. Mr. Kaufman's book establishes that the subject has a framework, and is susceptible to analysis in depth. Mr. Cleaver's article at the time of its publication was a unique source for data that had been widely scattered among numerous periodicals and publishers, and which had not been thoroughly evaluated.

There remains, however, an additional function to be performed, that of extending the topical coverage into those areas that have been overlooked or minimized. In addition, the review and updating of Mr. Cleaver's article appears to be desirable. It also seems to be urgent at the moment to make a presentation, in basic terms, of what the problem is, how it relates specifically to auditing, and what the auditing profession must do to absorb it. This leads naturally to a review of the audit function.

An independent audit is conducted to express an opinion on the financial statements of a business enterprise or a nonprofit organization. An internal audit is conducted in order to determine the extent of compliance with management directives in financial matters. It is important in discussing the relevance of auditing as applied to electronic digital computers not to forget or to neglect the fundamental function of auditing. Review of the purpose of auditing makes it possible to delineate the areas of auditing that are germane to this discussion, and to omit the areas of auditing that are not relevant.

Auditing Areas Affected by Electronic Data Processing

Basic auditing literature suggests that a suitable framework for analysis

[1] "Electronic Data Processing and Auditing", Felix Kaufman, The Ronald Press Company, 1961.

[2] "Auditing and Electronic Data Processing", Goodrich C. Cleaver, *The Journal of Accountancy*, November 1958.

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would be the concepts, standards, procedures, and techniques that are generally accepted or used by auditors in connection with their work. There is general agreement, however, that auditing concepts do not change for purely mechanical reasons. Thus we can safely eliminate a discussion of *concepts* from the analysis. Nor do the ultimate *objectives* of auditing change by reason of electronic data processing. Regione, for example, says:

> "I think it is obvious that the objectives of auditing thus defined will *not* change with the advent of computers or any other form of mechanization. Regardless of what means are used to process business transactions, the auditor's responsibility with respect to the basic objectives will remain the same. He must satisfy himself that the transactions are legitimate, that they have been coded and recorded correctly and that the accounts have been summarized into financial statements in accordance with sound and generally accepted principles of accounting."[3]

Auditing standards, which are established in light of objectives and concepts, are also independent of the accounting system. However, the standards for auditing field work are general guides to procedure, and the procedures of auditing *are* affected by the advent of electronic data processing. It will be helpful, then, to review the three basic standards established to guide procedures. They are:

1. Adequate planning.
2. Evaluation of internal control.
3. Obtaining adequate evidence to form a basis for the auditor's opinion.[4]

That these standards must be met in any auditing engagement is clear enough. The question that arises is, *can* they be met in the case of electronic data processing systems? Logic suggests that the internal control and evidence standards are the crucial ones for us here. However, this does not mean that all internal controls and all methods of obtaining evidence are affected by electronics.

According to Toan's initial judgment, cash and inventory counts and confirmation of receivables are among the methods of obtaining evidence that are not affected by electronics.[5] Subsequently, however, Blank states that confirmation procedures may "change considerably".[6] This would include situations

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[3] "Electronics—How Does It Affect Our Auditing Program?", Basil Regione, Address before the Institute of Internal Auditors, May 1956.

[4] *Generally Accepted Auditing Standards,* Committee on Auditing Procedure, American Institute of Accountants, 1954, pp. 13-14.

[5] "Auditing, Control, and Electronics", A. B. Toan, Jr., *The Journal of Accountancy,* May 1955.

[6] "Electronics and the Internal Auditor", Virgil F. Blank, *The Internal Auditor,* March 1957.

where "routines will have to be developed for choosing the items for confirmation, especially where such items will require special handling, such as duplicate copies or print-outs on special forms".[7]

It would appear that examination of physical assets or assets-rights is an aspect of auditing that is of little concern to the development of procedures for auditing electronic systems. Thus the aspect of auditing that *will* require analysis is the obtaining of transactions evidence, that is, evidence to support shifts or changes in asset or equity records, rather than inspection of the assets and the equity certificates themselves. Electronic data processing systems are essentially paperwork processing systems. To the extent that this is not the case, they perform the same functions that paperwork processing is used for in manual systems.

. Allied to the network of paperwork is the related organization for data processing. Organization is important to the auditor in determining the extent of the existence of adequate internal control. Pelej refers to this when he states that the auditor's basic interests include, among others, assuring himself of the extent of safeguards against fraud and error.[8] The importance of internal control in electronic systems is cited directly or indirectly by almost every other author who has written on this subject.

The above examination leads to the conclusion that there are two major areas of auditing that may have been affected by electronics. These are the area of paper evidence, or what has come to be known as "audit trail", and the area of internal control. For this reason substantial portions of this paper are devoted to those topics. Assuming that some substantial changes have been or will be effected in audit trails and internal control techniques, it is also desirable to discuss briefly the impact of these changes on the education of accountants for audit work. In addition, there will be considered any changes in auditing procedures that are possible in light of the advent of computers, which formerly did not exist. The use of the computer by the auditor to perform routine auditing chores is an obvious possibility. Developments along these lines are treated to the extent that they seem to have been employed. The amount of attention to each topic considered is more or less relative to developments in auditing as reflected in the literature to date.

The Audit Trail

The term "audit trail" refers to that group of documents, journals, worksheets, and final ledger postings that makes it possible for the auditor to observe a summarized total, such as accounts receivable, and, working backwards, to deter-

[7] *Ibid.*

[8] "How Will Business Electronics Affect the Auditor's Work?", Joseph Pelej, *The Journal of Accountancy*, July 1954.

mine whether the summarized total accurately reflects the transactions engaged in by the business enterprise. The term seems to be one that has come into being with the advent of computers, even though the reference is to a concept that is not recent in origin.

The fundamental problem interposed by the computer is the question as to whether this trail is as easy to follow in automatic data processing systems as it would be in a manual or semi-automated system. Although the initial impression was that the audit trail would provide no problem in this respect,[9] it now appears that at some date in the future, a substantial problem will exist, from the point of view of maximum data processing efficiency. That is, it has been suggested that the more efficient the system, the less adequate will be the audit trail.

No doubt, if one is talking about a completely automated system, that is, one in which transactions are originated in machine-sensible form, and management is interested only in exceptions data, the possibility of tracing from the summaries to the original evidence becomes much reduced. It has been suggested, however, that in the typical data processing situation as it exists today, these criteria not only are not being met, but at the moment, at least, are not even desired by management.

> "The explanation of why the auditor has not had difficulty in finding an audit trail in ADP systems is understandable. The information needed by the auditor to satisfy himself is usually the same information that management requires with greater frequency to operate and control the organization."[10]

That the question is basic has been demonstrated by coverage on the part of most of the writers on the subject. For example, Hamman refers to the reduction in "intelligent human scrutiny of documents and details of accounting data";[11] Kaufman and Schmidt speak of the absence of journals and registers, and prior postings in the accounts to be found in electronic data processing systems;[12] Grody refers to the "growing obscurity of the audit trail".[13] Each of these writers has answers to the problem, of course. More significantly, Cadematori notes that the trail has not necessarily been obscured—it has been altered.[14]

The proposals that have been made to make sure of the existence of traceability are basically three in number.

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[9] Joseph Pelej, *loc. cit.*

[10] "Auditing Automated Data Processing", Kenneth G. Cadematori, *The Federal Accountant,* June 1959.

[11] "The Audit of Machine Records", Paul E. Hamman, *The Journal of Accountancy,* March 1956.

[12] "Auditing Electronic Records", Felix Kaufman and Leo A. Schmidt, *The Accounting Review,* January 1957.

[13] "The Auditor Encounters Computers", Charles E. Grody, *The Internal Auditor,* March 1959.

[14] Kenneth G. Cadematori, *loc. cit.*

1. All transactions can be printed out during the processing. In a system in which transactions are batched and sorted prior to processing, each transaction should be assigned a serial number and dated. The last posting to any given account should have a reference to the date and serial number of the transaction. When the account is next processed, the transaction number of the previous posting can be printed out on the transactions register. Thus the historical record of account postings can be maintained, even though the account itself shows only the current balance.[15]
2. In a random access system, due to lack of sequencing of input data, a page number instead of the date and serial number can be used. The page number of the printout for a current transaction affecting an account is stored in the account. When the account is next processed, the page number is picked up and printed out in the register of transactions in which the new transaction is listed. In the same manner, the page number of the new transaction is stored in the account.[16]
3. Source information can be obtained on a selective basis and posted to the balances as of the last prior statements. The results can then be compared with current balances.[17] To facilitate this technique, input cards can be filed according to the account affected.[18]

A fourth possibility arises from the essential nature of the relationship between certain kinds of business enterprises and their customers, creditors, and regulatory agencies. The possibility is that, in addition to cross-referenced transactions or in lieu of them, the ledger accounts themselves will continue to be provided in detail.

Summarizing what has been written about audit trails, then, it appears that the consensus is that auditors so far have nothing to fear. The trail will be continued, although in many cases it will be altered. In some, detailed ledger postings will continue to be made. Where it is unnecessary to have the historical record of ledger postings, as in the case of inventory accounts, transaction cross-referencing can be employed. If transaction cross-referencing is not employed, selective updating of the master file from a prior period may possibly be the auditor's method of creating his own audit trail. At present, it appears that printed listings are used pretty regularly in existing systems.[19] The problem of audit trail is largely one that will exist in the future. Techniques have already been cited in the literature to meet various possible situa-

[15] Richard G. Canning, *Electronic Data Processing for Business and Industry*, John Wiley and Sons, Inc., 1956, p. 194.
[16] Felix Kaufman, *op. cit.*, p. 165.
[17] Kaufman and Schmidt, *loc. cit.*
[18] Kenneth G. Cadematori, *loc. cit.*
[19] Felix Kaufman, *op. cit.*, p. 163.

tions that seem to have more relevance to future problems than those of today.[20] Whether the data processing situations that the techniques are designed to solve will materialize remains to be determined.

The Audit Trail in a Commercial Bank

It has been suggested that businesses will have to continue furnishing their customers with detailed monthly statements, copies of which will be available to the auditor. Commercial banks provide a good case in point. The Fidelity-Philadelphia Trust Company has installed and put in operation an RCA 501 computer and related peripheral equipment. The computer application of greatest interest is the demand deposit posting operation. This operation includes procedures that seem to be eminently satisfactory from the point of view of audit trail.[21] At the time the procedure was devised, a member of the internal audit staff was trained in programming and participated in developing the necessary internal controls.

The basic procedure may be described briefly before analyzing the audit trail. The main steps are as follows:

1. Transit proves daily transactions from the tellers' department and settles with the tellers' department. This step is conventional. Proof machines are used to prove deposit slips against checks and debit tickets.
2. An "add-punch" department prepares paper tape input to the computer, by batches. A batch is confined to a group of checks, or a group of deposit tickets, but not both. The work of this department must settle with the transit department.
3. Data processing creates magnetic tape from paper tape, and sorts transactions into account number sequence.
4. Data processing posts individual transactions to the depositor's ledger, and prepares a transactions register. The latter must prove to the sum of the add-punch batches (plus and minus adjustments for bad input and miscellaneous errors—error procedure is prompt and provable).
5. Transactions register totals are used to prepare general ledger debit and credit tickets.
6. The debit and credit tickets are used to post the general ledger.

The data processing posting operation requires further analysis. There are basically five computer runs involved, as shown in Exhibit 1. The first two runs prove and convert paper tape, sorted by batches, into magnetic tape, sorted

[20] Felix Kaufman, *op. cit.*, pp. 151-163, provides some good examples.

[21] The procedure to be described is as of the time of the initial application. Due to the installation of additional equipment, it is in the process of change.

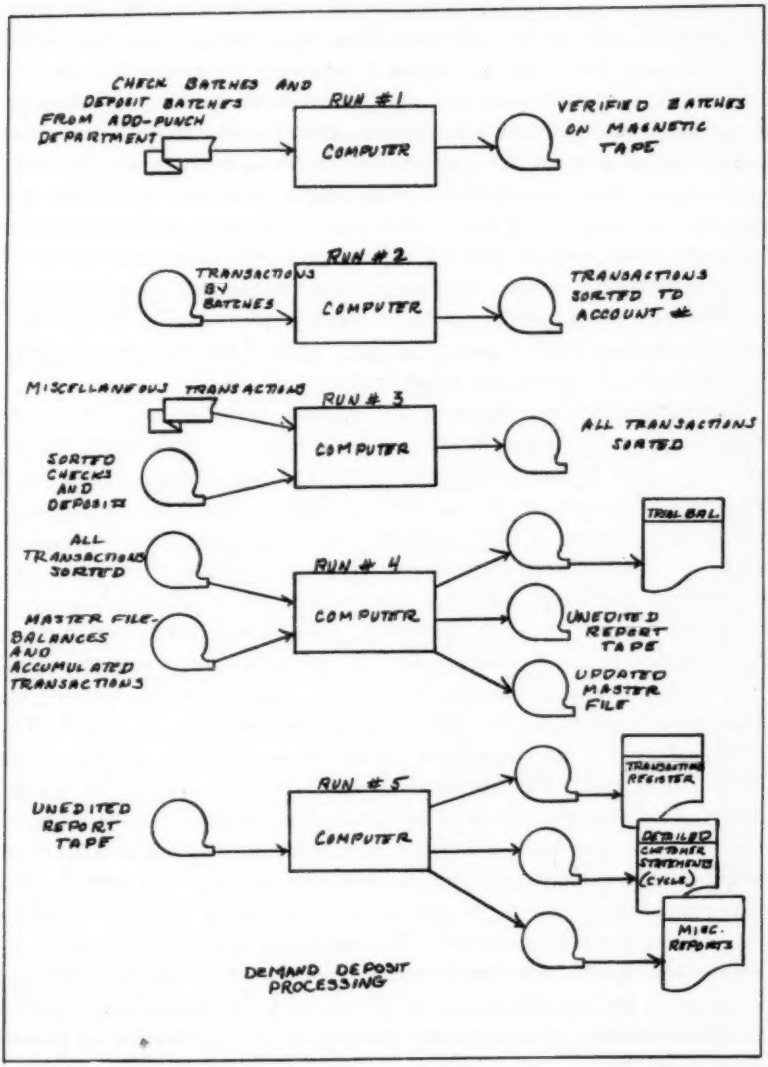
CHECK BATCHES AND DEPOSIT BATCHES FROM ADD-PUNCH DEPARTMENT
RUN #1
COMPUTER
VERIFIED BATCHES ON MAGNETIC TAPE
RUN #2
TRANSACTIONS BY BATCHES
COMPUTER
TRANSACTIONS SORTED TO ACCOUNT #
MISCELLANEOUS TRANSACTIONS
RUN # 3
COMPUTER
ALL TRANSACTIONS SORTED
SORTED CHECKS AND DEPOSITS
ALL TRANSACTIONS SORTED
RUN # 4
COMPUTER
TRIAL BAL.
UNEDITED REPORT TAPE
MASTER FILE-BALANCES AND ACCUMULATED TRANSACTIONS
UPDATED MASTER FILE
UNEDITED REPORT TAPE
RUN # 5
COMPUTER
TRANSACTIONS REGISTER
DETAILED CUSTOMER STATEMENTS (CYCLE)
MISC. REPORTS
DEMAND DEPOSIT PROCESSING

EXHIBIT 1

by account number. The latter is hereafter referred to as the daily transactions tape. The remaining runs have three inputs—(a) the master file, which contains customer balances, (b) accumulative transactions (actually trailers in the master file) showing the detailed transactions for all customers since statements were last prepared, and (c) the daily transactions tape. The main purpose of the runs is to post the depositors' ledgers by updating the master file. Outputs include (a) an updated master file, (b) updated trailers showing (for all cycles except the current one) the detailed transactions for all customers since statements were last prepared, (c) a report tape, containing details for the statements of customers whose statements are to be prepared currently (statements are prepared on cycle), (d) a trial balance print-out of every account balance in the ledger, fully updated, and (e) a print-out of all current transactions, in sequence by account number. The last print-out (transactions register) includes reference data which make it possible to identify each transaction by type, and by the batch from which it came. The grand totals of the print-out must agree with the debit and credit tickets to general ledger.

The usual underlying documents are available in this system. Checks are microfilmed for permanent record. The existence of a transactions register provides a link between underlying documents and customers accounts and statements. Inasmuch as no journal was prepared under the pre-computer system, this provides a more substantial audit trail than was previously in existence. The statements themselves are prepared in detail. Prior to the date of statement preparation, the customers' balances are in invisible form. The daily trial balance, previously referred to, indicates only the current balance. If at any time prior to a statement date, the auditor wished to trace the details of a particular customer's account back to their origins, he could do so via the transactions registers for the dates since the last statement was issued. The individual items in the transactions register can be located by reference to the daily trial balance. This document displays, for each account, the account number and name, the amount of the last deposit, the date of the last deposit, and the date of the last transaction, as well as the current balance. Each transaction can thus be confirmed from the account to the supporting journal, since it is referenced by date in the daily trial balance and is traceable, therefore, into a given transactions register. The transactions registers are sequenced by number, which also facilitates the search. It will be noted that this technique is similar to the one proposed earlier in this article for magnetic tape systems. It differs primarily in the need for searching to the trial balance for date of prior transaction.

It is important to note once more that the audit trail provided is a more

comprehensive one than that which was available in the prior system. The extent to which so elaborate a trail is required by the auditor is quite another question. If the examination date corresponds with the statement date for particular customers, the transactions register-trial balance combination is unnecessary for audit purposes. Presumably, the auditor could more easily satisfy himself with respect to such accounts by tracing the checks and deposit tickets directly into the statements. However, for the accounts of other customers, examination of events subsequent to the last statement preparation date does require the newly provided trail, since the records subsequent to the last statement are on tape. The trail will obviously be valuable also in connection with depositors' inquiries.

Internal Control

It was pointed out long ago that the *requirements* of a good system of internal control for an electronic data processing system do not vary from the requirements for manual and semimechanized systems.[22] Initially, a number of control *problems* were recognized as being potentially of great concern. Among these were (a) unintentional loss of data,[23] (b) possibility of operator intervention in data processing,[23] (c) reduction in the number of persons processing a given transaction,[23] (d) machine error,[24] and (e) conversion of cards to tape.[25] More recently, the various specific points where controls are most important have been summarized under three headings, namely, controls over input, machine controls, and programming controls.[26] To these can properly be added controls over output, which mean controls over tapes which are outputs from one run and inputs to the next. The physical controls over tapes have been mentioned frequently and appear to be both necessary and desirable.[27] In a recent article,[28] Schoenfeld speaks of the necessity for error controls, a subject which deserves separate consideration.

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[22] Joseph Pelej, *loc. cit.*

[23] A. B. Toan, Jr., *loc. cit.*

[24] Kaufman and Schmidt, *loc. cit.*

[25] "Audit Techniques for Electronic Systems", Daniel M. Shonting and Leo D. Stone, *The Journal of Accountancy*, October 1958.

[26] *Internal Auditing* (Second Edition), Victor Z. Brink and James A. Cashin, The Ronald Press Company, 1958, pp. 335-337.

[27] See, for example, Charles E. Grody, *loc. cit.* Holmes also mentions controls over tapes, *Auditing: Principles and Procedure*, Fifth Edition, Arthur W. Holmes, Richard D. Irwin, Inc., Homewood, Ill., 1959, p. 249.

[28] "A New Environment for the Auditor", Carl H. Schoenfeld, *The Internal Auditor*, Winter 1960.

Almost all of the writers on the subject have touched upon input controls. The consensus seems to be that controls currently recommended for document processing in manual systems are adequate but that the premium for keeping such controls tight is much higher in the case of electronic data processing than is the case in manual systems. The absence of any documentation at all, mentioned in connection with audit trail, no longer seems to be an issue, although it appeared frequently in the earlier literature.[29] Kaufman and Schmidt point out that documentation of external transactions will continue because of the needs of customers and creditors, that documentation of internal transactions will continue because of the requirements of employees, and that in the event of automatic recording of transactions, these considerations will dictate that the recording be in more than one medium.[30] According to Shonting and Stone, the controls basically are as follows:

1. Registration at point of document entry.
2. Sequential numbering with full accountability at point of document origin.
3. Grouping or "batching" with predetermined document counts, or other control totals.[31]

These points are familiar and require no elaboration. However, input is sometimes created by methods rather recent in origin; one of the unique problems involves controls over data received by wire transmission (teletype, teledata, transceiver, and similar devices). The obvious problem involves loss of data. In the case of the transceiver, Shonting and Stone suggest that each batch of cards transmitted be accompanied by a control card indicating the totals of the batch. The cards produced at the receiving end may then be proved to the control card.[32] This is an application of the general principle of batch control through predetermined totals.

Machine controls are part of the system within the data processing center itself. These are the controls furnished with the hardware by the manufacturer, such as double arithmetic, parity checking, and duplicate circuits. The accuracy of computers from a technical point of view appears to be very high, and this problem is, therefore, not a difficult one to resolve relative to problems of human error. The details of built-in features are very clearly and explicitly explained by Kaufman.[33] They do not need to be given extensive consideration here.

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[29] See, for example, A. B. Toan, Jr., *loc. cit.*, and Kaufman and Schmidt, *loc. cit.*
[30] Kaufman and Schmidt, *loc. cit.*
[31] Shonting and Stone, *loc. cit.*
[32] Shonting and Stone, *loc. cit.*
[33] Felix Kaufman, *op. cit.*, pp. 87-92.

Programmed controls, as the name implies, have to do with the nature of the programs themselves. It is possible for a number of checks and controls to be built into the programs. This is true whether manual or automatic coding is employed. The controls should be provided for in the detailed flow charts that precede coding. The nature of these controls depends upon the kind of error, intentional or unintentional, that can reasonably be anticipated.

In an early article, Toan mentions the testing of theoretical data against programs. He suggests "ample protection" against unintentional loss of data by a proper records retention program.[34] Kaufman and Schmidt somewhat later refer to the proving of totals developed outside of the computer center.[35] In the event of failure, they suggest, the computer ought to be able to return to a previous proof point and recompute the total (in the case of machine malfunction) on which a failure occurs. A failure not due to machine malfunction points up a weakness in developing input data (against which additional controls may be installed). These authors also discuss path selection proofs (programming designed to test the reliability of programmed switches), and the verification of tapes through programming.[36] Shonting and Stone mention program loading checks including (a) tests for availability of input-output devices, (b) checks of indicator switches, and (c) correctness of tape reels mounted on input-output devices. They also raised the question of predetermined totals, and cross-footing as programmed controls.[37]

A fairly obvious kind of programmed control is that which permits the computer to validate input data for input error and bad readings. Reasonableness and limit checks are also commonly used. A reasonableness check may be illustrated by comparing the total gross wages in a given wage rate class as calculated by multiplying total hours by the rate, with the total wages as calculated by summing the amount for each employee in that class as calculated separately. A limit check may be illustrated by testing to see whether an employee's recorded hours exceed a maximum established by company policy.[38]

McCullough describes a programmed control known as the "internal control log," a device to assure agreement among the totals of separate runs which utilize the same input date.[39] In his example, McCullough uses the illustration of three inventory runs, as follows:

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[34] A. B. Toan, Jr., *loc. cit.*
[35] Kaufman and Schmidt, *loc. cit.*
[36] *Ibid.*
[37] Shonting and Stone, *loc. cit.*
[38] "Internal Control and the Mechanization Program", J. A. Richards, *The Pennsylvania C.P.A. Spokesman*, April 1961.
[39] "The Auditor Uses the Computer", Thomas E. McCullough, *The Internal Auditor*, December 1959.

1. A run to produce "on hand" data for storekeepers (stores stock record run).
2. A run to produce information for purchasing (stock control run).
3. A stores accounting run.

A preliminary "edit" run for new inventory transactions and changes establishes control totals for the net change in "on hand" and "on order" data. Inventory transactions are then processed in the stores stock record run, to which one of the inputs are the control figures established in the "edit" run. The amounts posted to the stores records are accumulated in the processing and are then compared with the control totals. The control totals are subsequently passed on to the stock control run and then to the stores accounting run. In each run, the control totals are compared with the changes accumulated in processing the records. If there is an error, the exception is printed out. If not, it is known that the balances from each run are in agreement.[40] The procedure described applies the principle of comparison of results with pre-determined totals to a series of separate runs, the inputs to which must be entirely consistent. It should be noted that in the case described, the control is completely automatic, since the initial determination of net change is calculated by the computer, and the control totals are then passed on from one run to the next, without manual intervention.

Several authors refer to the need for check points in programs.[41] This technique calls for periodic determination of the accuracy of processing at a particular point in a program, covering the steps that have taken place since a similar check-point in the program. If errors are discovered, the technique makes it unnecessary to re-run the entire program. Instead, the program is automatically restarted at the last previous successful check-point, a technique sometimes referred to as "roll-back." In effect, the program makes certain tests of memory to see if the contents are what they should be; if not it returns to the last preceding check point and reprocesses the data. The check point procedure is recommended for long programs, at intervals which are usually not greater than fifteen minutes.[42]

An internal control problem which programming cannot solve in and of itself is the possibility of console intervention. This term refers to the operator's ability to interrupt processing manually through the console, and to manipulate

[40] This description is based upon a letter to the author from Mr. McCullough, dated April 14, 1961.

[41] See, for example, Price Waterhouse and Company, *The Auditor Encounters Electronic Data Processing*, International Business Machines Corporation, New York, 1956, p. 10; Shonting and Stone, *loc. cit.*, Brink and Cashin, *op. cit.*, pp. 336-337; and Grody, *loc. cit.*

[42] Shonting and Stone, *loc. cit.* But note that fifteen minute intervals may be too long for the newer and faster machines of today.

the data. Richards suggests three controls in this connection:

1. Accounting for processing time—the operator cannot manipulate without a substantial delay.
2. Review of the supervisory control typewriter print-out. This discloses operator intervention, both necessary and unnecessary. (Note that, in some systems, the operator can prevent the print-out. Hence this control is not available on all kinds of equipment. On some IBM machines, a locked recording device is available, to which the operator does not have access.)
3. Rotation of duties among operators, change of shift, and similar techniques (parallel to those recommended for cash receipts control).[43]

Separation of Duties

The discussion to this point has centered upon controls over input, controls over machine operations, and controls over output. It may be useful to examine internal control from the standpoint of separation of duties as well. The general internal control principle is that duties should be so separated that the processing of data is separated from the handling of assets and that the processing of data is itself so arranged that a transaction is processed by persons other than those who control the transaction. Electronics has brought about a recognition of a third group whose duties must be separate, namely, those who plan the processing, that is, the systems men.[44] The nature of programming, which, broadly conceived, encompasses systems analysis, programming at the flow chart level, and coding, is such that the planners (especially systems analysts and programmers) operate within an area where they have a substantial control over the planning of transactions processing. It follows that they be separated from data origination, its physical processing and its final reporting.

Controls Over Error Data

As previously pointed out, Schoenfeld has mentioned the need for control over error data. He states that more error data may be expected in electronic systems than in manual systems, inasmuch as computers will detect error more effectively than humans do. The basic principle enunciated is that, when error data are discovered, they must be corrected and entered into the next machine cycle. Naturally, the character of the error determines the manner in which

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[43] Richards, *loc. cit.*

[44] "Computers and Auditing", John Nolan, Arthur Young and Company, Unpublished manuscript.

it should be handled. However, the need for controls, i.e., for basic policy covering each and every kind of error, is very clear.

The Fidelity-Philadelphia Trust Company system provides an example of modern error detection and correction. In the initial computer run, the batches of checks (or of deposit slips) received from the add-punch department are proved to predetermined totals. If a batch does not prove to the predetermined total, processing stops, and the batch number, and amount of the error are printed out on the monitor printer. The data processing supervisor then adjusts the difference between the batch total per computer and the batch total per add-punch department, via a paper tape input device. The amount of the adjustment, which permits the batch to prove, is debited or credited to a special suspense account. The details of the bad batch are printed out and, while processing continues, the details are proved back to the hard-copy adding machine tape in the add-punch department. The monitor print-out of the error is retained for auditing purposes. After the error is located, the amount of the error, supported by appropriate debit and credit tickets, is reprocessed as part of the next day's run. The reprocessing corrects the customers' accounts affected, and clears the suspense account for the errors of the preceding day. Experience to date indicates that a maximum of twenty errors are to be expected in fifty thousand items processed. These are almost always the results of bad parity or of unreadibility of punched information. Error routines for situations such as absence of an account number (new account, or closed account, for example), are also provided for in the company's programs.

In concluding these notes on internal control, it will be useful to contrast some of the early generalizations with current thinking. Pelej, in 1954, was of the opinion that internal control would be strengthened by the advent of computers, owing to a reduction in rehandlings of data.[45] Toan, in an early article (1955), expressed the following opinion:

> "The control exercised by fewer individuals with a greater appreciation of the implications of the transactions may well be an effective substitute for the division of duties among the many."[46]

Hamman also stated (1956) that internal control would be kept strong by appropriate internal procedures in input and output control.[47]

By contrast, Toan says in a subsequent article that the duty of the auditor is to assist his clients in developing new internal controls consistent with an efficient

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[45] Pelej. *loc. cit.*
[46] A. B. Toan, Jr., *loc. cit.*
[47] Hamman, *loc. cit.*

system. He then points out that these new controls are not yet clearly formulated.[48] Grody (1959) refers to a new area of control, the physical area:

> "Its principal components would be a comprehensive indexing system, a trained librarian and the promulgation of certain rules relating to the authority of personnel to have access to the tape storage files".[49]

Schoenfeld (1960) also views the auditing future with uncertainty:

> "We need to develop a broad view of changing methods, new and improved tools, new systems, and new control concepts. We will have to be prepared to deal with changes in organization, in records and in techniques".[50]

Although Schoenfeld discusses control, much of his thinking centers upon the broad outlines. What is lacking, and with good reason, is detailed implementation.

There has been a subtle but reconcilable shift, then, in the thinking of auditors, both internal and external, about internal control. The initial attitude seems to have been that there was no problem stemming from the introduction of electronic data processing. However, at that time, it appears that auditors believed that familiar kinds of internal controls would be adapted to electronic systems (and they were right). Now we seem to have reached a stage in which it is feared that the use of familiar controls may be impeding the efficiency of data processing. At the moment, it seems difficult, if not impossible, to state what new controls are needed, what old controls can be eliminated, and the extent to which change is necessary or desirable. We may look for evolution rather than revolution in this matter. There is little merit in change for change's sake. The development of valid and rational criteria for internal control requires more thought. It also requires an increase in the number of persons qualified to reconcile the twin aspects of audit need and data processing efficiency. It does not yet appear that the number of such qualified persons is adequate.

Using the Computer to Perform Auditing Procedures

An idea that has been advanced with growing force in recent years is that of having the auditor write programs which could be run on the client's computer and which would, in essence, validate the records in a much more comprehensive manner than was formerly possible. Analysis of the published materials does not make it clear that the technique is used extensively as yet, but it is used to some extent.

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[48] "The Auditor and EDP", A. B. Toan, Jr., *The Journal of Accountancy*, June 1960.
[49] Grody, *loc. cit.*
[50] Schoenfeld, *loc. cit.*

As early as 1955, Toan suggested that the auditor's techniques might change drastically, although he did not elaborate.[51] In 1956, the Price Waterhouse brochure stated that "There is the possibility of the auditor having his own file of programs".[52] It is not clear whether the reference is to a file of copies of the client's programs or a unique file of programs for audit purposes. The former idea has been mentioned by a number of sources but has distinct disadvantages, the most important of which is the large number of changes that take place in the typical routine, particularly in its early history. At this point in time, in any case, there had been no genuine recommendation along the lines of having auditors write audit programs for the computer to carry out. The number of installed computers was not large. (By contrast, it has been estimated that as of March 1, 1961, there were 4900 data processing computers that had been delivered and there were 6,500 more on order.[53]) That the idea had not been clearly stated is evidenced by Hamilton's statement (1957) that ". . . to date there have been no major changes in audit programs themselves."[54]

The first genuine reference to the possibility of using the computer to audit appears to have been made by Shonting and Stone (1958).[55] The effect of such a suggestion on recommendations with respect to the training of auditors is obvious.

Two methods of auditing using the client's computer have been suggested by Cadematori. The first involves adding a loop of instructions to the client's program. This has the advantage of not requiring a separate run for the auditor's sake. On a fully loaded computer, says Cadematori, the loop may be the only way in which the auditor can take advantage of the machine. He states that loops are particularly useful where the client's programs call for print-outs of exceptions only. However, he leans more toward separate programs written by the auditor, if the greatest benefits are to be obtained.

The benefits of using the computer to help in auditing procedures are as follows:

1. It permits more extensive audits.
2. It permits better selection of items for follow-up.
3. The experience of senior auditors can be incorporated into programs conducted by juniors; less supervision of junior auditors will be required.[56]

McCullough describes a payroll audit as conducted by the external auditors at

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[51] "Auditing, Control, and Electronics", A. B. Toan, Jr.
[52] Price Waterhouse and Co., *loc. cit.*, p. 16.
[53] "Computer Census", *Data Processing*, April 1961.
[54] W. T. Hamilton, "Control by Integrated Data Processing", *The Internal Auditor*, June 1957.
[55] Shonting and Stone, *loc. cit.*
[56] Cadematori, *loc. cit.*

Consolidated Edison of New York. Prior to the use of specially written computer programs, the auditors had to make tests of correct net pay calculations and had to test, by comparison of records, the validity of new hires, terminations, rates of pay, titles, minimum and maximum rates within titles, and transfers.[57] With the separate audit program, the auditors are able to determine automatically that:

1. The correct number of employees was paid.
2. Withholding and social security computations are accurately computed.
3. Total withholding and gross pay as accumulated agree with the general ledger.
4. All persons in each title (classification) are paid between the established minimum and maximum for the classification.
5. The classifications of employees in the master file agree with the classifications in the payroll.
6. Changes in pay have been authenticated.
7. Other changes (new hires, terminations, transfers) have been authorized properly.
8. Any exceptions discovered in the above proofs are printed out for further scrutiny.

To quote the author of the article:

> "This is a new approach, and we believe that this application has only scratched the surface in this area. It is also becoming more evident that perhaps in this approach we may have come upon a solution to the statistical sampling contention. For here we have the ability to get maximum coverage with minimum time, effort and expense".[58]

A conceptual representation of the audit program is reproduced in Exhibit 2.

Training of Auditors for Examination of Electronic Systems

Over the years there seems to have been a shift in the thinking as to what auditors need to know about electronic data processing. This shift more or less mirrors the rapid increase in the number of installations that exist. Pelej, with very little in the way of installations to go on, was of the opinion that while auditors *might* have to learn some programming, this eventuality was unlikely (1954).[59] Toan stated (1955) that the auditor needed a *general* knowledge of programming.[60] He suggested that for any special problem, the auditor enlist the services of a specialist.

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[57] McCullough, *loc. cit.*
[58] *Ibid.*
[59] Pelej, *loc. cit.*
[60] A. B. Toan, Jr., "Auditing, Control, and Electronics".

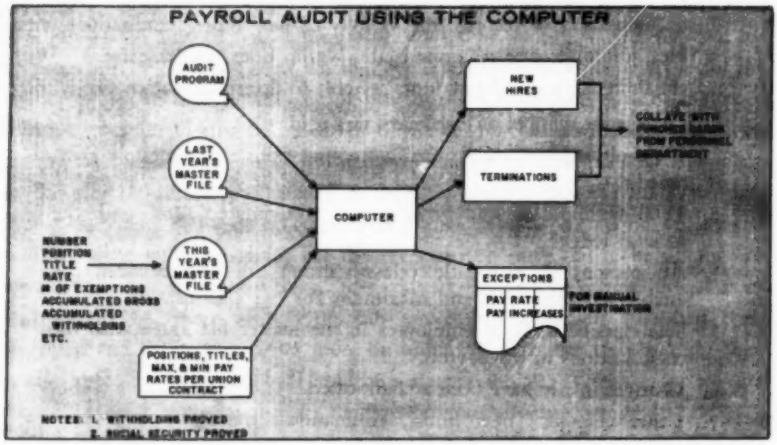

EXHIBIT 2

The Price Waterhouse pamphlet (1956) likewise suggests that a general background in computers will suffice. Experience in coding is not required, say the authors, although some degree of technical information is required.[61] This source also implies that auditors may rely on the built-in controls of the manufacturer, that is, that machine reliability in this respect is very high.

However, the year 1956 marks the beginning of a change in the recommendations made for auditor's training in matters of programming, evaluation of controls and related subjects. Hamman refers to the need for auditors to know something about how computers operate, and familiarization with the basic plan of data processing in effect.[62] In the following year, Blank came out flatly for a distinct program of self-preparation on the auditor's part. He states that minimum preparation would encompass a formal study of the basic theory of stored-program computers. Blank also recommends that auditors attend programming schools and supplement their education by textbook study, if necessary.

> "During these next few years every auditor will have to acquire some knowledge of electronic equipment, if he is to retain his stature in the field of auditing".[63]

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[61] Price Waterhouse and Co., *op. cit.*, p. 19.
[62] Virgil F. Blank, *loc. cit.*
[63] *Ibid.*

The theme of increased familiarity with electronics pervades most of the more recent literature that follows. Grody discusses the training of the internal auditor in terms that suggest it must be quite thorough. However, he does not feel that typically a standard programming course is the answer. He describes his company's program of training, devised by himself, and encompassing the following subjects:

1. Introduction to basic equipment.
2. Review of the characteristics and use of each item in a digital computer system.
3. External coding—data representation.
4. Internal information structure and codes, including binary representation.
5. Internal and external storage.
6. Analysis of the problem of adapting the company's data-processing requirements to the system.
7. Documentation of data and flow charting of the system.
8. Basic concepts of programming.
9. Review of peripheral equipment.
10. Review of computer logic and logical units.
11. Methods of handling and correcting errors.
12. Problems of internal control.[64]

The course as described requires about seven days of formal study.

Holmes (1959) states that the minimum qualifications of an auditor for electronic systems includes:

1. An understanding of basic programming.
2. An understanding of the machine and program controls.
3. Familiarity with flow charting.
4. Knowledge of output capacities.
5. A "general knowledge" of electronic equipment and principles.
6. An understanding of the mathematics required in operating the equipment.[65]

McCullough also emphasizes the need for specific training. A study of the internal controls is not enough, unless accompanied by formal training. He cites an interesting hypothetical case of an auditor, satisfied of the internal controls in existence but who is not aware of the problem of "console interference," and assumes without reason that the internal controls assure integrity.

> "The need for computer-educated auditors cannot be stressed too much."[66]

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[64] Charles E. Grody, *loc. cit.*
[65] Arthur Holmes, *op. cit.*
[66] McCullough, *loc. cit.*

Most of the more recent articles on the subject emphasize that not only must the auditor have training in electronic data processing but must be prepared to train himself. Nor should he rely upon the management services department's specialized knowledge. He must himself understand the fundamentals.[67]

From this brief history of the literature on auditing, we may reasonably conclude that, as computers become more commonplace in industry, the greater will be the need for a large number of auditors fully trained in the skills of data processing. Training should not be for the sake of increasing the number of people qualified to operate EDP systems but for the sake of increasing the number of auditors qualified to pass upon the output of such systems. Our evidence for this conclusion lies only in part in statements increasingly insisting that such training is necessary, although it is clear that this idea is now receiving wide acceptance. It follows also from the understanding that the auditor can improve his auditing techniques and the size of his samples by employing the computer to do part of his work. It is evident that the development of computerized audit programs must be the work of people with skills and knowledge beyond that normally expected of the auditor operating in manual and semi-automated systems. If the auditor expects to perfect his skills, and to grow in his profession, he must be prepared to make the additional sacrifices necessary to acquire an appropriate education.

Those who are familiar with computers are well aware that understanding of the many facets of physical components and their uses, of programming, of terminology, and of systems design does not come easily. The subject is a very complex one, and it is also an area in which a little learning is a dangerous thing. It is probably true that the auditor need not understand all of the subtleties of coding that are so dear to the hearts of programmers. He must, however, so train himself that he can evaluate a client's system authoritatively. It is a case of the more education the better.

A Note on the Employment of Auditing Models

Recently, the idea of auditing computerized systems through the use of models has come into the literature. The concepts cannot be said to be very well developed at this stage. Lemke has suggested that an auditing model may be an approach that will make it unnecessary to require techniques and controls that are appropriate to manual systems but which seem to impede the efficiency of electronic systems:

"A logical development is to use ratios, graphs, historical relationships,

[67] A. B. Toan, Jr., "The Auditor and EDP".

known movements of resources, and any other relevant data, to construct a model of what the business should have accomplished during the period under review and then to measure the known results against this model. In other words, to establish a pattern of auditing over-all accomplishment somewhat similar to what is done in standard cost accounting. The audit would then be devoted extensively to a review of the exceptions uncovered in the process between actual and expected. This sort of thing is supposedly done in many audits, but it is doubtful whether it is acceptable as the only or main audit service leading to an auditor's opinion."[68]

The idea expounded by Lemke obviously requires much additional study before it can be fully implemented. However, it would appear that in light of the stated purpose of internal auditing, it has considerable merit.

The idea of models put forth by Toan probably has more relevance to the external auditor. He notes that one of the functions of the auditor's customary review of internal control is to determine what the procedures are supposed to be, and then to see that the procedures are actually being followed. He points out that the client's computer programs provide an exact model of the client's procedures, and can be tested by feeding them both good (or relevant) and bad (or irrelevant) data. Another concept of the model advocated by Toan is the use by the auditor of "normal standards." This concept requires quantitative factors that would determine the items that must be given specific attention by the auditor. Examples of quantitative factors cited include:

1. The dollar amount of a specific item.
2. The volume of transactions.
3. The percentage variation of expenditures from budget, from standard, or from a prior period's data.[69]

Certain non-quantitative factors, such as the account or vendor involved or the department originating a transaction are also mentioned. Having established the criteria, the computer could then conceivably be used to identify the auditor's problem areas. Toan's warning that working out a system of this kind would not be easy is, of course, well taken. On the other hand, the use of such criteria is not unknown in auditing. In fact, the past decade or two has seen a trend toward the use of specific criteria in determining how thoroughly an item must be investigated. Cadematori also mentions the use of the computer to screen out the exceptions that must be reviewed.[70]

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[68] B. C. Lemke, "Some Effects of Data Processing on Accounting", *The Internal Auditor*, June 1957.

[69] "The Auditor and EDP," A. B. Toan, Jr.

[70] Cadematori, *loc. cit.*

It is clear that these ideas have some importance in considering the future of auditing in a mechanized era. We are reaching or have already reached a crossroads, at which point auditors must decide to plan their activities in a manner that will be of greatest benefit to their clients and their companies. Without any fundamental change in concepts, objectives or standards, the auditor's procedures and techniques will have to be tailored to maximize the efficiency of our new data-processing tools. The note on auditing models is suggestive of the kind of thing that *may* constitute an answer. In any case, we cannot afford to stand still. The inexorable logic of the age of automated production, as well as of automated information processing, demands that we proceed with the job of implementation as soon as possible.

Nor is it possible to assume that the job is one that can be done once and then forgotten. More change is to be expected. Vacuum tubes gave way to transistors. Storage techniques indicate a possible shift from magnetic core memories to thin magnetic film memories. The speed of data movement and calculation has increased enormously. Some changes will make no difference to the auditor; others will. It should be evident that a considerable job of education is required for the auditor to be able to decide intelligently just which changes will affect his work, and thus be able to adapt and adjust in a flexible manner.

Effective Overhead Budgeting

by KENNETH E. McMULLEN

NO BUSINESSMAN in his right mind will deliberately overprice his product. To avoid this, businessmen spend large amounts to improve established lines or develop new ones, exert heavy pressure on the sales force to increase sales and keep the engineering people continually alert for improved designs. Progressive manufacturing organizations use time studies, material improvements, more sophisticated machines and techniques to build better and cheaper products. If these efforts are to be successful, it is imperative that overhead costs, which in many cases make up one-third or more of the total product cost, be managed intelligently. It is the job of the controller's organization to simplify the understanding of what overhead is and to establish and maintain a system of control that is not only clearly understandable to the "controlee" but comparatively inexpensive to implement.

Many names are used to describe overhead, such as pool expenses, burden, indirect costs, etc. This profusion of titles compounds our problem of understanding because, to be sure that we are communicating properly, we must define what it is we want to talk about before we can talk about it. For simplicity, overhead can be defined as "those costs that are incurred for the general operation of the business and are not specifically applicable to any one product line." Within this definition, many questions arise as to the effective budget treatment of these expenses. An important factor is to be "consistent"; determine which costs you want to classify as overhead and keep them that way, tempered of course, with good judgment in the light of changing operating conditions. However, to jump back and forth from direct costs to indirect is sheer death to an effective overhead budget program. This problem (and pressure if your overhead management program is a good one) is highlighted in the logical classification of employees. When the indirect labor squeeze is on, a great desire is generated by the operating people to either classify as much activity as possible as direct product work to be performed by direct labor or to assign people classified as direct labor to do the indirect type of work.

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Establishing the Budget

To establish an effective overhead management program, the budget must, first, have full management support and, next, be compatible with the company's financial plan. This plan is usually a financial management budget, generally spanning a single year. Once management has agreed to the financial results shown in the management budget, the perimeters are defined within which the overhead budget can be established.

In determining the goals for the budget, all three "classical" methods can be used, i.e., appropriation, forecast and control. In addition, the budget segregations that are controllable should, without exception, be arranged so as to be identifiable to "individuals" of authority, whether by function, organization and/or responsibility. If this is not done, the identification of control points is impossible. It is mandatory, therefore, for the budget function to be closely allied with the accounting operation so that the needed segregations can be a part of the accumulation of actual expenses.

Mechanics of Budgeting— Bench Marks

Basically, there are two categories of overhead expense, controllable and semicontrollable. It should be noted that the word semicontrollable rather than noncontrollable is used. If a company is desirous of an enthusiastic budget program, it will not admit that there are very many expenses that are not controlled. All expenses reflect management decisions to some degree; tates the categorization.

Those expenditures that can be directly related to specific operating decisions should be considered controllable, e.g., indirect labor, supplies, telephone and telegraph, entertainment, travel, etc. Within each of these accounts, budget bench marks must be determined, against which the actual expenditures can be compared. A good, simple rule of thumb is to analyze how and why the expenditures are made, and build the budget rules around them. For example, supplies, packing and crating, and perishable tools sometimes statistically follow the direct productive effort of the company. If so, a rate per direct labor hour is a good indicator. Advertising and outside training and conference accounts can be budgeted against management appropriations and, finally, budget for expenses such as travel and expendable equipment can be determined on the basis of past experience.

Semicontrollable expenses are those that are generated as a result of decisions by higher management, the effect of which is felt over longer time spans. Examples of these are group insurance, employee retirement plan, property and building rentals, etc. Here again, each account must be analyzed in order to properly forecast

anticipated expenditures in total within the budget time span as well as the period in which the expenditures are to be made, so that the monthly allocations will be sensible. Inclusion of these expenses is necessary to round out the overhead budget and rate.

Methods of Budgeting

Outlined here are two simple methods of overhead management: (1) major control by account and minor by organization within the account and (2) major control by organization and minor by account. From the overhead budget department's point of view, since we already have the amounts established by account in the financial plan, to lock in the account totals and apportion amounts to using organizations seems to be the easiest and most logical thing to do. This means that, if one organization overspends while others underspend, so that the account total is not overrun, the company's budget objectives are met satisfactorily. The weakness in this method is that of detracting from holding the using manager to strict responsibility for his share; if his colleagues are underspending, he assumes license to overspend. The second method, that of basic responsibility assignment by organization, can be definitely and clearly controlled. Within the confines of the financial plan, each account is parceled out by organization and, after the operating head agrees to his share, he is committed to spend only up to this amount, no matter what is spent by others. In fact, the concept of total account control is not introduced in the budget program at all, even though the budget analysts plot over-all account status. In this way, the spending organization head, knowing his limits, can easily monitor expenditures within his budget and the budget analysts can set the budget for each organization on the basis of meaningful and easy-to-explain data.

This budget concept is usually considered by the budget people as a simplification of overhead budgeting; it is easy to convey it to the responsible people, since they understand what they have to do. Sometimes the manager being budgeted feels that, under this system, he is too restricted to do a good managing job. The complaint has some validity; to "box him in" by single accounts may be too stern indeed. As a matter of fact, even by broadening the manager's authority to control by groups of accounts, the simplicity of the method can be still maintained. In this manner, the managers can be over and under in various single accounts but, as long as they are under the grouping total, they report well. In selecting the categories, it must be kept in mind that logical groupings must be put together, such as the supplies accounts, indirect labor accounts, repair and maintenance accounts, etc., so that the degree of control is not weakened in the process. As a result of this, the manager being

budgeted tends to feel that this authority is now at par with his position in controlling his budget.

Possible mechanics and methods of overhead management have been outlined above, but how do we apply these techniques? First, an agreement must be reached with the operating people as to the ceilings, whether by management appropriation, by negotiation "as required" or on a regularly scheduled basis. When the total amount is to be allocated to one function, there is no problem, but if the allocation crosses organizational lines, the amount must be prorated.

With respect to the negotiation method, after the initial budget has been agreed upon by the operating people and approved by management, you can either renegotiate as required, triggered by major changes in the financial plan, or establish a regular meeting schedule. The pertinent weakness to the first negotiation technique is that the subject of overhead control tends to get lost in the hustle and pressures of the manager's implementation of his functional responsibilities, whereas, if regularly scheduled meetings are held, e.g., quarterly, reviewed and renegotiated, if required, the managers are forced to take specific notice of this phase of their responsibilities. The latter method is the better one.

It was mentioned earlier that control segregations should be made identifiable to "individuals" of authority. In the smaller companies, control points can be easily established at the level where the expenditures are authorized. In larger companies, a detail control could be too burdensome to be administered effectively, in which case a higher level of authority would be designated. A balance must be struck between economy of budget administration and the effectiveness of the program. Usually the size and organizational structure of a company are the basic determining factors. Since a budget program is designed to control people, the individuals (functional heads) who are responsible for the company may want the share of expense allocated to them to be reallocated as they see fit. Others may want the budget function to do the allocating and administering for them. In either case, expenditures must be easily traced to the specific authorizing individuals, to ensure proper control.

Communicating Budget Status

Unless good budget report procedures are followed, a budget system cannot work effectively. Those who are being held responsible must be given timely and simple reports which plot their progress within the budget span or they will lose interest as well as decline the responsibility for the implementation of their budget goals. It is difficult to develop for management standard sets of reports that will be read and instantly understood.

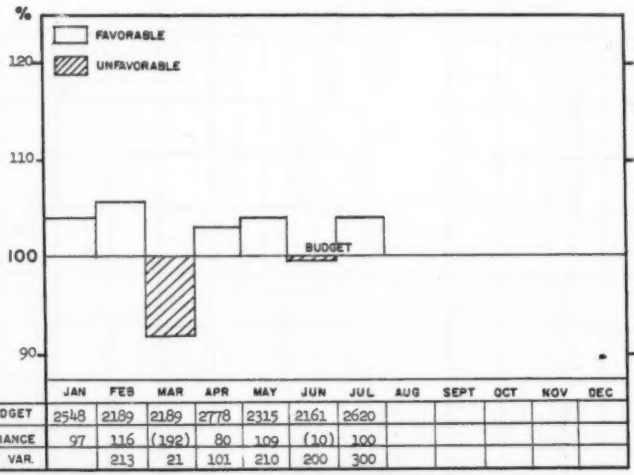
EXHIBIT 1

BUDGETED EXPENSE REALIZATION

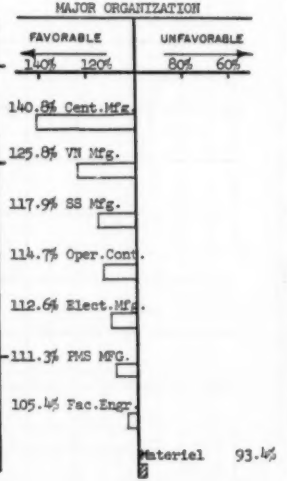
FOR MONTH ENDED - July 31, 1960

MSOR-F-T
CHART 11

OPERATIONS



MAJOR ORGANIZATION



($000)		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
	MO. BUDGET	2548	2189	2189	2778	2315	2161	2620					
	MO. VARIANCE	97	116	(192)	80	109	(10)	100					
	Y/DAT VAR.		213	21	101	210	200	300					

COMMENTS: July Budget Performance for Operations was 103.9% or under budget by $100,000 for the month. Indirect Labor, show significant underruns totaling $192,000; while Utilities, Travel, and Maintenance Material show overruns totaling($90,000). On a year-to-date basis, performance is 101.8% of budget with favorable variance of $110,000 in Labor, $30,000 in Shop Supplies, $50,000 in Travel Expense and $60,000 in Repair and Maintenance Material.

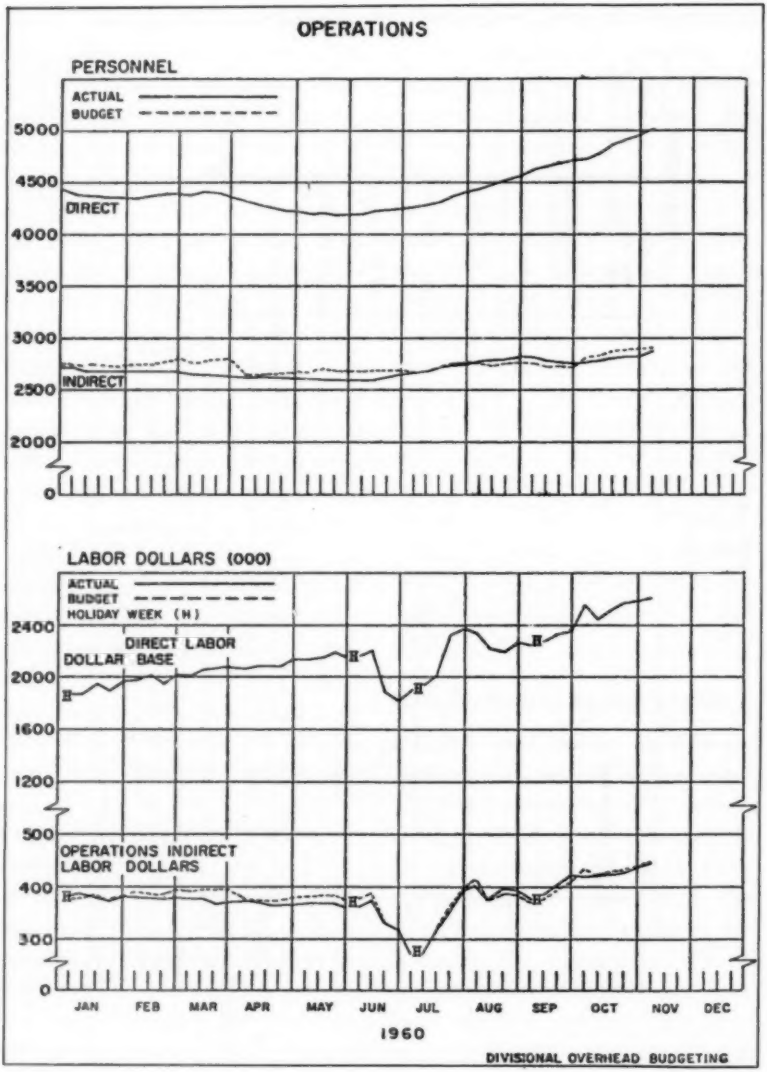

OPERATIONS
PERSONNEL
ACTUAL
BUDGET
5000
4500
4000
3500
3000
2500
2000
0
DIRECT
INDIRECT
LABOR DOLLARS (000)
ACTUAL
BUDGET
HOLIDAY WEEK (H)
2400
2000
1600
1200
500
400
300
0
DIRECT LABOR
DOLLAR BASE
OPERATIONS INDIRECT
LABOR DOLLARS
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
1960
DIVISIONAL OVERHEAD BUDGETING

EXHIBIT 2

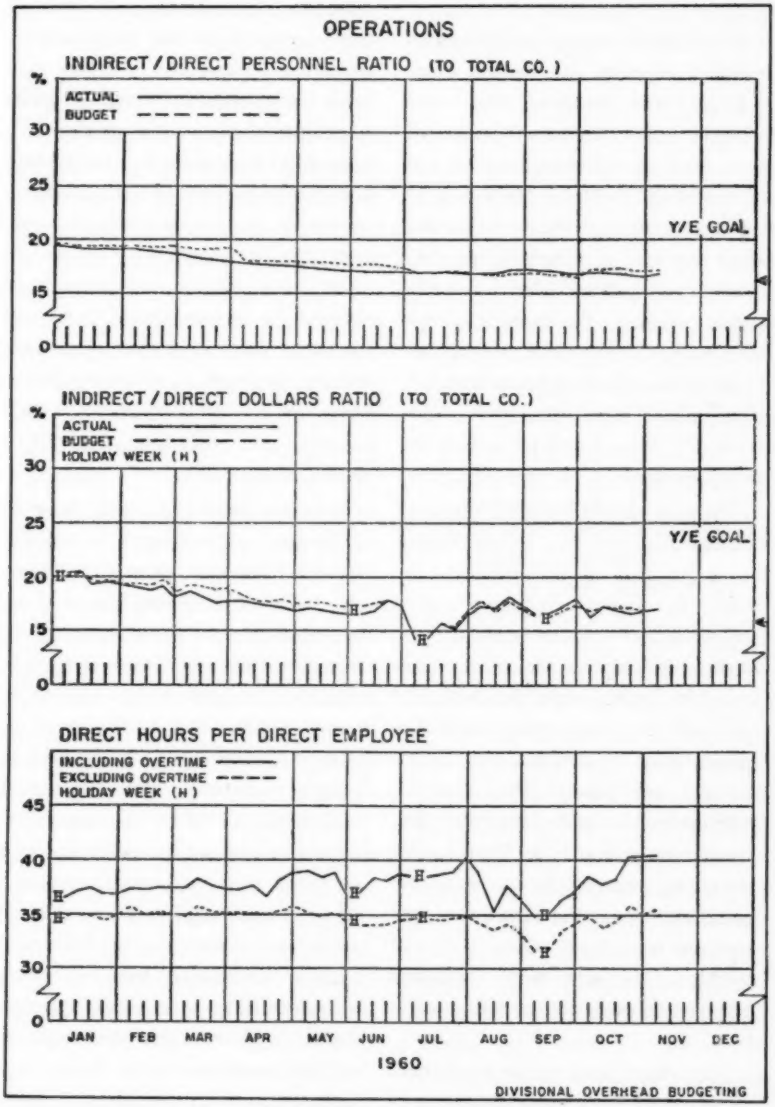


EXHIBIT 2 (Cont'd)

However, this does not excuse the budget function from its responsibilities.

In a normal scheme of things in business, expenses are usually billed and paid for monthly. This automatically limits the *over-all* budget report (Exhibit 1) frequency to not oftener than monthly. However, in vigorous companies, major items that affect overhead are generally reported more often. Indirect labor is a prime instance of this. For example, if you have weekly pay periods, you can effectively report each week indirect dollars, indirect to direct labor dollar ratios, overtime expended and so on, as in Exhibit 2.

The rule should be that, whenever economically feasible, reports should be as frequent as the operations demand. In order to be effective, a good budget reports system must be pertinent, not only to the manager responsible for the expenditures but his boss and top management as well. The reports must be compact, easy to understand and timely. They must be published no later than the week following the end of the prior pay or accounting period. The sooner the reports are issued, the faster the manager can take timely action in case of trouble or to cope with a problem before it becomes detrimentally important.

For comprehensive communications up the line, it is important to tailor your reports to fit the individuals receiving them. Some organizations prefer charts and graphs, others prefer tabulated digits. In smaller companies, these requirements are fairly easy to determine. However, in larger concerns the problem of devising reports sometimes seems insurmountable. If a reasonable solution cannot be reached, and this only after the budget organization has made a thorough investigation of the recipient's desires, an effective compromise can sometimes be secured by showing both charts and tabulated data. This technique, while not the optimum in reporting philosophy, serves the purpose of understanding and, therefore, acceptability by the readers.

In every reporting system there are exceptions and resistance to standard reports. You may attempt to submit chart data to those who prefer it and tabulated data to those desiring that method. This soon becomes cumbersome, particularly within large companies, creating a mild but expensive chaos. In any event, a standard reporting system is more economical and accurate. There is one fundamental danger in this system that must be tested from time to time. That is to see if the recipient either no longer reads the reports or he has never "really" understood them and relies on subordinates to keep him informed orally or by arranging your report to suit his particular desire. While there will always be this problem, it should be the budget organization's goal to

generate reports that will be read and understood, with action taken as a result of the information contained in the reports.

The Budget Organization

The budget job is invariably an unpopular one; therefore, the individuals that work in this operation must by nature be thick-skinned, "have cool heads and keen minds," be diplomatic, and be stern and cold-hearted when the situation requires it. Basically, the overhead budgeting operation is concerned with two operating relationships, one with general management and the other with the operating organizations. With respect to the former, the budget function is responsible for recommending and implementing all approved overhead budget policies and procedures, annual objectives, special reports and forecasts, and giving counsel as required. The responsibilities involving the operating organizations include negotiation of the operating overhead budgets, monitoring and reporting of budget performance applicable to these organizations, and the providing of policy and procedural advice.

It is an important requirement that the budget analyst have a definite day-to-day working relationship with the assigned operating organizations. It is through him that a budget program can either be a well administered program or one that could be apathetic and ineffective. It is a thin line of demarcation which the budget analyst must observe because, to do this job properly, he must gain and retain the respect of the people with whom he must deal in the operating organizations, even though he must still follow up and enforce the commitments which the budget represents. This, of course, is a difficult task. It is, therefore, important that the people assigned to the overhead budget function be experienced in accounting and forecasting techniques and be mature in their dealings with the operating people.

Generally, the basic functions of a budget organization can be categorized in three groups:

1. Establish overhead budgets and forecasts.
2. Furnish operating overhead budget bench-marks.
3. Furnish overhead budget performance data.

With respect to establishing overhead budgets and forecasts, it is the responsibility of the budget function to create budget proposals and negotiate budgets for applicable elements of overhead by organization. As a result of the negotiations, recommendations are made to management for acceptance of these results to be used as goals for the company. The budget function must develop overhead projections and other related data for inclusion in management budgets, performance and other reports as required. It must deal with operating organizations' requests for budget revisions and make recommendations to

management regarding these revisions and the potential effect on the company's budget goals.

Further, the budget function may develop overhead rates to be used for the purpose of pricing the company's products. This type of forecast should reflect what the company "thinks" it will do rather than what it "hopes" to do with respect to overhead costs. As a result of this philosophy, the overhead rates used for pricing purposes are usually higher than management goals, particularly if the company has a vigorous overhead control program and has established fairly low targets.

The second basic responsibility is to furnish operating overhead budget bench-marks. In this regard, the budget function must make measurement policy recommendations to management. These usually take the form of establishing the methods of determining budgets and the revision of these methods as operating conditions dictate. Within the perimeter of these yardsticks, the budget function must develop the company's over-all budget objectives to be compatible with the financial plan, actual experience and revised goals of the company. The budget organization must interpret for management the effect on indirect costs of alternate courses of company actions. It is important that management be given as much information as possible in the time available so that it is better equipped to make sound decisions. The overhead budget function must be particularly alert in this area, so that management will be cognizant of overhead ramifications applicable to proposed decisions. A good example of this is the overhead effect of organization changes. In growing companies it is often necessary to change the internal operating organizational structures to make them compatible with changing conditions. If the overhead budget function is not alert, the effect of "Parkinson's Law" could be in full force. This is not to imply that the recommendations of the budget function are always taken, but these recommendations should be made available to management.

The third basic function of the overhead budget organization is to furnish overhead budget performance data. Earlier, we discussed responsibility for the development of these data, and found that the budget organization must be responsible for the implementation and submission of the resulting reports. It must tailor its reports to fit each level of management, beginning with operating organizations, then summarizing as required in varying degrees depending on the organizational level, culminating in a basic summary report to top management. It is the budget function's responsibility to decide when management should receive unsolicited special reports. The additional special reports should be made only to indicate data of importance to top management and

they should be of a broad enough scope to warrant management's attention for action.

Further, the budget organization must monitor budget performance and make recommendations to management. Many times this is an unpopular task in that, when an operating organization is exceeding its budget, it becomes the responsibility of the budget organization to recommend to management the action required to bring the erring organization within its target. However, before the budget function seeks top management's help, it must first exhaust all avenues of approach available to it to work with the organization in order to help it overcome its over-budget problem. Only then, after a dead end has been reached, should the matter be referred to top management.

Budgeting and Manpower

As a part of the implementation of a successful overhead budget program, the budget function must continually seek methods by which it can determine the proper staffing of the indirect operations. Personal investigations should be made in the operating organization to specifically determine needs. With respect to this technique, it is becoming apparent in industry today that indirect work measurement programs can be successfully implemented, the resulting savings of which more than offset their costs. By using the techniques of industrial engineering and of time study methods, many voluminous paper handling operations can be measured. By establishing standards against which to do the work, it becomes possible to submit reports that will indicate the efficiency of the operation and whether it is properly staffed. In order to do this, the work content of the organizations' activities must be specifically determined, performance standards established and recommendations implemented concerning method and procedural improvements.

Work force requirements must be established on the basis of known and planned volumes of activity and resulting reports submitted showing performance against standard time allowances. This operation is a vital part of a dynamic overhead budget program, particularly in larger companies where considerable volumes of paper are handled for an operation. For example, the matching process in accounts payable, pay-roll operations, reproduction operations, etc., fall within this category. Once work force determinations have been made and mutually agreed upon between the operating management and the budget organization, they become an effective control tool to determine the efficiency of the operating organization.

Status of the Budget Organization

Although it is obvious that the budget organization should be a part

of the controller's responsibility, the questions of the point and level of contact merit consideration. The budget organization may feel that it should report to the president; the operating organizations may be convinced it should be buried under the mail room supervisor. However, budget function should be placed so as to carry proper weight in its dealings with the various levels of management. Commonly, a budget organization carries department status so that the head is a manager and, therefore, ranks at a level similar to that of operating management.

Depending on the size of the company, it is not uncommon for all budget functions to be placed under a single responsibility, i.e., project or product budgeting, fixed asset budgeting as well as overhead budgeting. Usually the larger companies, in order to do an effective job, will separate these functions to raise their status and permit staffing of the function with higher caliber employees.

It is essential that the budget manager have the authority to cross organization lines in the implementation of his responsibilities. If he is required to operate within the confines of a vertical organizational structure, his effectiveness will be impaired. On the other hand, assigning authority to the budget manager to contact whomever he may find necessary will put him in a much better position to do a dynamic job.

Means and Results

The discussion in this article has been of a fairly broad nature. The techniques of account segregation and methods of budgeting have been summarized in an effort to intrigue you to think about your overhead budget program in the context of this presentation. Now that the high points of overhead budgeting have been explored, we should like to tie it together by summarizing how a good budget program should be operated.

First, top management must sincerely desire a vigorous budget program. Without this support, budgeting becomes largely a game. As such it is a waste of people's time.

Next, the budget function must be placed high enough in the company organization to permit effective dealing with all levels of management. It should be a part of the finance or controller's organization, assigned sufficient authority to request and receive account accumulations compatible with an effective program.

The accounts should be clearly segregated in categories that will easily enable the budget function to establish "operating responsibility" with respect to expenditures. Budgets should be established and then negotiated and renegotiated on a regularly scheduled basis. Each negotiation should seek improvement, and techniques to do this should be determined and used.

After agreement has been reached with respect to budgeted targets, actual activity should be compared to these targets in timely reports that will enable the operating manager to control and the budget function to monitor results easily and effectively. Operating reports should be submitted at least once a month (longer spans such as quarterly will not do the job). If possible, shorter time spans should be used. With rapid progress of machine accounting, this is becoming easier. Information received from these reports should be studied by the budget analysts and timely follow-up action taken to ensure that the operating organizations are "tracking" properly.

The budget function should continually analyze overhead expenditure characteristics so as to be able to forecast intelligently for pricing and financial purposes. This knowledge should also be used to inform management of potential problem areas as a result of unfavorable trends.

It is our opinion that if the overhead budget function is placed within the above framework, your company will be in a much better competitive position to progress in your field. If it is not done this way, you have weakened your ability to produce your products as economically as possible within your capability. You can bet that your competitors are continually seeking ways "to run you out of business." A more effective overhead management program is one of these.

Depreciation as an Element of Cost in Federal Operations

by A. T. SAMUELSON*

THE JANUARY 1961 ISSUE of the *N.A.A. Bulletin* contains an article by James O. Ellenberger entitled "A Look at Depreciation Accounting in Nonprofit Organizations,"

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which seems to me to convey the impression, not necessarily intended, that governmental units generally try to recover the cost of fixed assets by means of depreciation (last full paragraph on p. 57). Also, the article seems to imply that Government-sponsored units generally follow depreciation accounting. At the present time, however, few Federal government agencies do follow depreciation accounting as a general practice.

The Tennessee Valley Authority is cited in the article as an example of one Government-sponsored unit which follows accepted accounting principles in matters of depreciation as recommended by the American Institute of Certified Public Accountants. TVA records depreciation on its fixed assets and follows an acceptable depreciation practice. In determining rates for power, TVA includes depreciation as a cost computed by a method different than that used for its financial records; nonetheless, it can properly be said that the costs of TVA's fixed assets devoted to power production are recovered by means of depreciation.

TVA is a large and significant Federal water resources operation, but other Federal agencies are also concerned in a very significant way with activities for water resources development, including generation and marketing of commercial power. At these agencies, the commercial power rates are set at a level designed to provide sufficient revenues to repay the investment allocated to commercial power within a period shorter than service lives of the assets and any other amounts included in the repayment obligation. The amounts to be recovered, therefore, are not measured in terms which include depreciation as a component of cost but in terms of the specific repayment requirements.

The construction of Federal water resources projects is usually financed by congressional appropriations. The requirements for repaying the Government's investment in the reimbursable purposes of these projects are governed by provisions in law or policy adopted pursuant to law. For example, rates for the sale of commercial power are generally established at levels which will provide, over a period of years shorter than the service lives of the assets, sufficient revenues to cover (1) out-of-pocket power operation and maintenance expenses, (2) replacement of power facilities during the repayment period, (3) interest on the unrepaid power investment, (4) the power investment, and (5) in many cases, the repayment of the part of the investment applicable to other reimbursable purposes of the project which the beneficiaries of those purposes are not able or are not required to repay. In these cases, certain Federal agencies do not consider that depreciation is an element for measuring repayment or that depreciation (nor amortization) on facilities of water resource projects in service need be recorded.

Significant advances in financial management have been made by Federal agencies during the last decade in adopting accrual accounting and in accounting for all costs of operations, but many related problems remain to be solved. Among these problems are those involved in the recording of procurement, disposal and inventory of Government-owned property and, wherever appropriate, related depreciation. Under the circumstances, it is premature to imply that Federal agencies generally follow accepted accounting principles with respect to depreciation

Building the Factory Expense Budget and Its Utilization

by GEORGE B. CLEVELAND

TO CONSISTENTLY ACHIEVE predetermined objectives, a plan of action is required in all organizations, particularly those incorporated for a profit. They must have a definite idea where they are going and in what way the stated goals will be met.

The purpose of this analysis is to outline a plan of action for budgeting the factory expenses of a small manufacturing concern. To assist in understanding of what is involved, a theoretical company will be completely manned at the manufacturing level and cost dollars developed for all factory expenses. The procedures and techniques suggested, however, are not limited to small manufacturing concerns and can be widely utilized in budgeting for operations, projecting alternate plans into the future, and as an aid in controlling expenditures.

The Sales and Production Forecasts

Before any steps are taken to forecast expenditures, a plan of sales for the year ahead should be secured so that an intelligent production forecast can be developed. This may be easier said than done but one of the basic keys to the manufacturing expense estimate is an accurate production forecast. Ideally, the production forecast will be built from a realistic sales forecast after computing the desired inventory levels. If inventory levels at the beginning of the period under review are below programmed requirements, the production forecast will be "beefed up" to satisfy the entire sales forecast and to restore the inventory to the desired level. If inventories are above desired levels, naturally the opposite action will be taken.

When the production forecast has been secured, it must be converted into production hours, machine hours or whatever the unit production measurement base may be. In this example we use production hours as the factory production measurement base. Production hours per unit should be known. If they have been developed, the determination of total required production hours to satisfy the unit forecast is merely a multiplication problem. If the unit production hours are not known due to lack of engineering measurement or introduction of new products, estimates must be determined based on experience or on engineering analysis.

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Direct Manning Forecast

Carrying our example further let us assume that we have developed production hours per unit and that, upon translating the yearly unit production forecast into production hours, we determine that 228,000 hours are required to fulfill the production plan. Let us also assume that the company under analysis has machining and fabricating departments, as two basic production areas, and an assembly department. If this is the case, the total production requirement of 228,000 production hours must be detailed by production area. In this example an analysis of the total requirement shows that 161,500 hours will be required in the machining and fabricating department and 66,500 hours in the assembly department. Experience and estimated direct labor efficiency must be considered to translate production hours into direct labor manning. We assume that our study indicates that each direct labor employee can produce 1,900 production hours per year. The plan has proceeded to this point:

Department	*Production hours*	*Direct labor manning*
Machining and fabricating	161,500	85
Assembly	66,500	35
Total	228,000	120

It is here, after the specific factory load plan has been established, that the supporting salary and wage requirements should be considered. The building of the necessary organization and expenses from this point on must be determined in the light of the factory load and with the cooperation of each responsible operations manager, including foremen. Operating management must understand the basic plan in building a realistic budget forecast, and must have a part in the construction of it. Their understanding of the procedures utilized and the necessity of arriving at a realistic estimate of future costs, will greatly enhance the probability of their meeting the goals established.

Salaried Personnel Requirements

Let us suppose that, after extensive review with the operating managers, the salaried personnel and actual salaries necessary to support the production load are as follows:

Service category	*Number of personnel*	*Monthly salary*	*Account*
Works manager and secretary	2	$2,000	01
Stores and material handling	2	1,200	02
Works accounting	3	1,900	03
Engineering	5	3,500	04

	Number of personnel	*Monthly salary*	*Account*
Purchasing	3	1,830	05
Production control	4	2,430	06
Trainees	2	800	07
Inspection	1	750	11
Steam and heating	1	600	19
Maintenance	1	610	21 & 22
Machining and fabricating	5	3,250	01
Assembly	2	1,300	01
Total	31	$20,170	

The account numbers are indicated for reference to the basic budget, which is detailed on Exhibit 1. If at all possible, actual salaries and names or, at least, job titles or classifications should be detailed so that the forecaster knows exactly what and who is included in the budget. Whether or not salary adjustments, such as merit increases or cost of living allowances, are added to the basic salary rates should depend upon management policy and best economic forecasts available

All salaries are considered fixed, as the indirect personnel are geared to support a certain level of operation. This organization will very probably remain relatively constant unless the production load varies radically from the forecast level. Nevertheless, budget reviews, particularly manning, should be conducted quarterly to rectify any situation which has moved out of line.

Indirect Wage Personnel Expense

Again after a careful review with operating management, and after considering load requirements, the number of supporting wage personnel should be determined. Assume that our review points up the following requirements:

Service category	*Number*	*Annual wage*
Stores and material handling	4	$17,540
Machining and fabricating: material handling	3	13,312
Assembly: material handling	1	4,921
Inspection	4	18,793
Watchman	1	3,876
Steam and heating	1¼	5,429
Maintenance labor:		
Buildings	1¼	6,000
Machinery and tools	3½	16,571
Total	19	$86,442

Early in this analysis we determined the required production load to be 161,500 hours in the machining and fabricating department and 66,500 hours in the assembly department. However, when we attempt to balance

this shop-load we may be in trouble. A close analysis of the department-load capacity is necessary. Presume that the production from the machining and fabricating department primarily supports the assembly department. In this example we determine that the assembly department can produce the required load with one full-shift operation and with every work station manned. However, to ready enough materials for assembly and to satisfy the planned production requirements, the machining and fabricating areas require a fully manned second shift operation. With the necessity of a second shift determined, and the service wage personnel re-examined, operating management determines that overtime in certain service groups to satisfy peak loads and a night shift will be more practical than added personnel. The following revised wage requirements are determined:

Service category	*Annual base wage*	*Base overtime*		*Annual total wage*	*Account*
		Hours	*Dollars*		
Stores and mat. handling	$17,540	710	$1,612	$19,152	02
Machining and fabricating:					
Material handling	13,312	534	1,223	14,535	02
Assembly:					
Material handling	4,921	...	...	4,921	02
Inspection	18,793	773	1,727	20,520	11
Watchman	3,876	...	....	3,876	12
Steam and heating	5,429	223	499	5,928	19
Maintenance labor:					
Buildings	6,000	...	...	6,000	21
Machinery and tools	16,571	622	1,524	18,095	22
Total	$86,442	2,862	$6,585	$93,027	

Except for the maintenance labor for buildings and a portion of the maintenance labor for machinery and tools, all service wages will be budgeted as variable expense based on total plant hours. Shop production must support the service wage organization and, if the required service wage organization at the forecast factory load is accurate, the variable rates derived will and should hold for wide variations in factory load. Wage personnel required should be detailed by name and actual rate, or at least by job classification. Again, as with the salaried group, when this becomes a part of the budget, the forecaster knows exactly what is included in expense totals. Also, as with the salaried service group, a quarterly review is advisable, but it is not as critical, because the wage has been pegged to vary with

production variations, while the salaries have not.

While we are considering as variable all wage personnel, except a portion of the maintenance employees, this approach is not always advisable. The specific business and management policy will determine the degree of indirect wage variability. Also, in our example we have both fixed and variable expense in some accounts. It may be advantageous, particularly when the direct-cost accounting approach is utilized, to have only either fixed or variable expenses in each account. In some instances additional accounts could be utilized to obtain the desired effect.

Computing the Other Expense Categories

Indirect labor is usually a unique problem for each concern and often includes different types of cost. Set-up cost, down time, union activities, clean up, etc., may be included. Probably a reasonable budget buildup will include as many known factors as possible, plus an estimate of others, to develop an experience rate which will be tight but attainable.

Overtime premium is not a desired cost of business but it invariably occurs. It is often the least expensive way through a temporary peak production-load period. We would recommend that a minimum variable rate be included. Certainly, in this analysis, sufficient allowance must be included for the premium cost on the service wage overtime anticipated.

Night shift premium. The production plan demands a second shift in the machining and fabricating area. Night premium must then be budgeted in this area and also for any service requirements such as material handling and maintenance.

Vacation and holiday wage. Individual company policy must be determined prior to the establishment of a reasonable variable rate. In our example, the average wage employee gets a two-week vacation and all wage employees have eight holidays. The expense forecast would be computed as follows:

Vacation pay	10 days	80 hours
Holiday pay	8 days	64 do
Total hours per employee		144 do

Description	*Manning*	*Average rate*	*Hours*	*Vacation and holiday pay*
Machining and fabricating	85	$2.30	144	$28,152
Assembly	35	2.20	144	11,088
Service labor	19	2.35	144	6,430
Total	139			$45,670

Miscellaneous Expense

Miscellaneous controllable. Let us examine the following expenses which will be discussed under one heading but budgeted in detail:

Account number	*Description*
13	Travel
14	Car rental
15	Stationery and supplies
16	Scrap
17	Telephone and telegraph
18	Tools
19	Steam and heating material
20	Power and water
23 & 24	Maintenance materials

All these expenditures are at least partially controllable by first-line management. For example, although the budget will show maintenance material for buildings to be fixed at $1,100 per month, this type of expenditure is surely to some extent controllable, although not variable with production hours.

As in the case of salaries and wages, close inspection of necessary items is required and a listing of specific items included in each expense category should be compiled to assist first-line management in reporting expense accurately. This portion of the budget should be especially tight. It should ideally be an optimum target goal just within reach, if expense is effectively controllable. The builder of the budget must be as tough-minded with this classification of expense as he is with that of service personnel. There is no doubt that, if budgets are honestly bettered in this category, they should be reduced for future planning. In a period of rising prices for supplies, an automatic budget cut will be accomplished if the variable rate is held constant. This fact should be considered just as wage and salary increases are.

Miscellaneous noncontrollable. Under the general category we will discuss the following expenses which are, as with the controllable category, detailed on the company budget:

Account number	*Description*
25	Moving and rearranging
28	Fire insurance
29	Property taxes
32	Miscellaneous expense
33	Depreciation

This type of business expense is not primarily controllable in a limited period of time. Moving and rearrangement expense is placed in this category because it is considered an expenditure which would be authorized only by the works manager, not by first-line supervision. Miscellaneous expense must not become a catch-all account but should be carefully watched by the expense controller. All expense charged here should be of an exceptional nature and should be authorized by the controller. A suggestion with this type of expenditure is to forecast an ample amount, considering contingencies. This approach should provide some cushion for a possible underbudgeting ap-

EXHIBIT 1

Basic Cost Center Budget

1961

Acct. No.	Description	General Plant Fixed per month	General Plant Rate per hour	Services Fixed per month	Services Rate per hour	Mach. & Fabr. Fixed per month	Mach. & Fabr. Rate per hour	Assembly Fixed per month	Assembly Rate per hour
01	Supervision & clerical	2,000		1,210		3,250		1,300	
02	Stores & material handling			1,200	.084		.090		.074
03	Works accounting			1,900					
04	Engineering			3,500					
05	Purchasing			1,830					
06	Production & planning			2,430					
07	Indirect labor	800					.050		.075
08	Overtime premium	50			.020		.020		.020
09	Night shift premium				.007		.120		
10	Vacation & holiday - Wage		.200						
11	Inspection			750	.090				
12	Watchman				.017				
13	Travel	100							
14	Car rental			100					
15	Stationery & supplies	40		200		60	.300	20	.100
16	Scrap						.080		.040
17	Telephone & telegraph	30		150					
18	Tools				.026		.150		.040
19	Steam & heating			1,000	.026				
20	Power & water			950	.074				
21	Main: Bldgs. - Labor			500					
22	Main: Mach., Tools - Labor					210	.080	55	.030
23	Main: Bldgs. - Material			1,100					
24	Main: Mach., Tools - Material					270	.100	90	.050
25	Moving & rearranging	200							
26	Group insurance	284	.073						
27	Employees retirement	478	.113						
28	Fire insurance	100							
29	Taxes - Property	1,000							
30	Taxes - F.I.C.A.	372	.088						
31	Taxes - Unemployment	310	.073						
32	Miscellaneous expenses	100							
33	Depreciation	8,000							
	Total	14,264	.547	16,820	.344	3,790	.990	1,465	.429
	Production hours						161,500		66,500
	Production labor rate						2.30		2.20
	Production labor dollars						$ 371,450		$ 146,300

proach in the directly controllable items. For instance, tax increases may be anticipated as well as depreciation charges for all programmed additions of depreciable assets.

Fringe Costs Dependent upon Total Personnel Expense

In our over-all production plan it has been determined that 120 direct labor employees, 19 indirect wage service employees and 31 salaried employees are required. Assuming the following company obligations per employee, the remaining expense classifications would be computed as below:

GROUP AND COMPENSATION INSURANCE

Employees	*Yearly cost*	*Total*	*Account*
Wage—139	$119.74	$16,644	26
Salary—31	109.94	3,408	26

EMPLOYEES RETIREMENT

Employees	*Yearly cost*	*Total*	*Account*
Wage—139	$185.35	$25,764	27
Salary—31	185.03	5,736	27

TAXES—F. I. C. A.

Employees	*Yearly cost*	*Total*	*Account*
Wage—139	3% of 4800 = $144	$20,064	30
Salary—31	3% of 4800 = 144	4,464	30

TAXES—UNEMPLOYMENT

Employees	*Yearly cost*	*Total*	*Account*
Wage—139	4% of 3000 = $120	$16,644	31
Salary—31	4% of 3000 = 120	3,720	31

To follow our general fixed and variable plan, the salary fringe benefits will be budgeted as fixed and the wage as variable. Again, when this approach is utilized, a quarterly review is necessary, particularly concerning the salary portion.

The Basic Cost Center Budget

A complete expense summary has been accomplished thus far, as depicted in Exhibit 1. Before progressing further, it is advisable that yearly fixed total plant expense be determined as well as yearly total of variable expense for each area, and grand total of all expense, including both fixed and variable. This detail should be developed by account and, if past experience is available, compared to that experience by account. It may be that, in spite of the detail efforts and analysis, a summary picture might indicate that the budget is out of line in certain areas and should be re-analyzed.

EXHIBIT 2

Distribution of General and Service Expense

Acct. No.	Description	Basis of distribution	Total Plant Expense: Mach. & fabricating Fixed	Mach. & fabricating Variable	Assembly Fixed	Assembly Variable
01	Supervision & clerical	Appraisal	66,349		26,771	
02	Stores & material handling	Appraisal	9,648	27,367	4,752	11,241
03	Works accounting	Appraisal	16,188		6,612	
04	Engineering	Appraisal	29,820		12,180	
05	Purchasing	Appraisal	15,592		6,368	
06	Production & planning	Appraisal	21,870		7,290	
07	Indirect labor	Hours	6,816	8,075	2,784	4,988
08	Overtime premium	Hours	426	6,468	174	2,652
09	Night shift premium	Hours		20,513		463
10	Vacation & holiday pay - Wage	Personnel		32,917		12,683
11	Inspection	Appraisal	6,390	14,569	2,610	5,951
12	Watchman	Hours		2,752		1,124
13	Travel	Hours	852		348	
14	Car rental	Appraisal	240		960	
15	Stationery & supplies	Hours	2,765	48,450	1,075	6,650
16	Scrap			12,920		2,660
17	Telephone & telegraph	Hours	1,534		626	
18	Tools	Hours		28,434		4,379
19	Steam and heating	Sq. Feet	7,200	3,557	4,800	2,371
20	Power & water	Comn. H. P.	4,410	10,967	3,990	5,905
21	Main: Bldgs. - Labor	Sq. Ft.	3,600		2,400	
22	Main: Mach., Tools - Labor		2,520	12,920	660	1,995
23	Main: Bldgs. - Material	Sq. Ft.	7,920		5,280	
24	Main: Mach., Tools - Material		3,240	16,150	1,080	3,325
25	Moving & rearranging	Hours	1,704		696	
26	Group insurance	Personnel	2,369	11,883	1,039	4,761
27	Employees retirement	Personnel	3,987	18,395	1,749	7,369
28	Fire insurance	Sq. Ft.	2,160		1,440	
29	Taxes - Property	Sq. Ft.	7,200		4,800	
30	Taxes - F.I.C.A.	Personnel	3,102	14,326	1,362	5,738
31	Taxes - Unemployment	Personnel	2,585	11,883	1,135	4,761
32	Miscellaneous expense	Hours	2,556		1,044	
33	Depreciation - Buildings	Sq. Ft.	17,280		11,520	
33	Depreciation - Equipment	Appraisal	50,400		16,800	
	Total		303,723	302,546	132,345	89,016
	Production hours		161,500	161,500	66,500	66,500
	Fixed and var. expense rate per hour		1.88	1.87	1.99	1.34
	Total expense rate per hour			3.75		3.33

Computing the Overhead Rates

After determining both the individual account and cost center budgets and after extending those budgets to determine that they are reasonable in total, the distribution of the general plant and service expenditures to product cost centers should be approached. Distribution methods are to some extent an art rather than a science and the problem is best approached by one with a complete knowledge of the business in question. Some expenditures can be apportioned by specific appraisal of personnel's time to cost centers or products, some by connected horse power, some by usage of equipment, some by material cost, and some by the production hour, machine hour or labor dollar bases. Even when utilizing direct costing, fixed expense may be distributed first to cost centers then to products to determine period fixed product costs.

Exhibit 2 gives total plant expense after all distributions and after adding the production department's expense to the distributed totals. Noted at the bottom are the variable overhead rates derived, the fixed overhead rates, and the total overhead by production area. Reasonable appraisals should be made wherever possible to acquire the highest possible accuracy of final overhead rates, such as with machinery depreciation and with costs based on personnel. In the following summary the distribution based on personnel was derived after determining the salary, indirect wage and direct wage disposition:

Manning Appraisal-Summary

	Wage		*Salary*	
Machining & fabricating	99.2	71.4%	21.55	69.5%
Assembly	39.8	28.6%	9.45	30.5%
	139.0	100 %	31.00	100 %

Following this, all costs based on personnel, if wage, will be distributed 71.4% to machining and fabricating department and 28.6% to the assembly department. Salary costs will be distributed with 69.5% to the machining and fabricating department and 30.5% to the assembly department.

Those distributions based on square feet were made 60% to the machining and fabricating and 40% to assembly department according to floor space occupied. The fact that the service groups occupy 12,000 square feet has not changed this distribution because it also has been considered to be a 60%-40% split.

The connected horsepower rating is determined to be 65% in the machining and fabricating and 35% in assembly departments.

Other items are spread based either on total hours, 71% to the machining and fabricating and 29% to assembly

departments, or by definite appraisal of the expense activity. Other more appropriate methods as well as combinations of the above methods may also be used.

Budgets as an Expense Control Tool

While the distribution results are of special interest to the accounting forecaster and may be of interest to high-level management, they are not of particular interest to first-line operating supervisors. Distributions are at best confusing when talking expense control and are often misleading. For this reason, wherever possible, keep your distributions out of your regular expense reporting for control. Use the basic department budgets (Exhibit 1) in controlling expenditures.

In other words, control at the source and give supervision regular reports on only what they can control directly. First-line management are primarily interested in creating production quantities of the required quality and only secondarily in producing at a reasonable cost. They are not top-level business executives and we do not recommend treating them as though they were, in so far as reports are concerned. Such expenditures as depreciation, property taxes, insurances, fringe benefits (even though directly variable by the number of people employed) may and should be discussed at low-level management meetings. All management should know these costs are a part and a big part of the cost of doing business but to put a budget and actual depreciation dollar amount for the month on an operating statement issued for control purposes is worse than worthless.

We recommend issuing only significant, pertinent, simple expense reports. The operating foreman and service manager should get a copy of their basic budget (Exhibit 1) and a monthly report listing budget and actual for the month and year to date. While weekly statements make good accounting talking points, we have not yet been convinced that, with a complex manufacturing operation, a period as short as a week can be accurately or even sufficiently reasonably costed to be truly effective.

Unless absolutely necessary, never mail an expense vs. budget report which you expect to be utilized for control purposes. Too often they are stuffed in a drawer for later reference or carefully filed in a binder. Rather, as soon as you have examined the report, schedule definite sessions with each cost center manager or foreman. Take only one at a time and give your opinions orally while getting the feeling and suggestions of the responsible manager. I assure you that you will both add to your knowledge, and necessary adjustments will be based on mutual understanding as well as fact. Also, you will learn the techniques of one supervisor, which you will be able to constructively pass along to others.

Production Labor Efficiency

Our discussion thus far has assumed one extremely important variable which can aid or destroy this type of budget plan. This variable is production labor efficiency. We assumed earlier that our production plan could be accomplished with 120 direct labor people. If actual labor efficiency is only 85 percent of that assumed, we would need over 141 direct labor employees and the disastrous effect on our expense planning should be immediately obvious. We should just like to touch on this subject before closing, as it is of extreme importance in successfully meeting the established goal.

Direct labor efficiency must be measured. It must be closely followed by the budget planner. How this efficiency can best be measured will be determined by the specific manufacturing processes involved. In my opinion, this efficiency for control purposes cannot be measured effectively by monthly or weekly analysis of total labor dollar variances into time or rate variances. Most manufacturing procedures, processes and techniques are changing so rapidly and so constantly today, that definite efficiency measurement in terms of dollars becomes very difficult. Such analysis, when possible, is often too late to be effective. Probably a better approach is to measure each productive man or cost center in terms of units or standard hours produced each day, with these units or hours based on up-to-date engineered standards. Efficiency is a basic key to the success of such a program. Watch it carefully.

Versatile Technique

The practical budget plan described in this article is constructed upon a specific production capacity. The fixed expense portion of this plan is an operational, ready-to-produce fixed. However, because of this fixed content, the basic budget will be effectively accurate over fairly wide variations of production load. It can be used for control of expenditures, to assist in making management decisions on alternate productive output plans, to aid in determining relative product profit and contributions of product toward fixed cost absorption, as well as make-or-buy decisions. It provides the accountant with an extremely valuable tool to help him play an even more important part in top-level management decisions.

The General Ledger on Random Access Equipment

by A. R. OUTLAW

MORRISON'S is a restaurant chain founded in 1920. It operates 35 cafeterias, 65 industrial feeding units, 7 service restaurants and 2 warehouses throughout the southeast. We have a multi-corporate setup of over 75 corporations, in which the subsidiaries are wholly-owned by the parent company. Each corporation has its individual fiscal year.

The prime responsibility of the accounting department of any company is to keep accurate records and to report the results of operation to management as quickly as possible. At Morrison's we feel that our accomplishments toward this goal have been highly satisfactory since the installation of our IBM 305 RAMAC for general ledger accounting. The accounting department is located in a central office. Besides the general ledger, we handle accounts payable and payrolls for all units, the credit card system for the restaurants, and billing and perpetual inventories for the warehouses.

Our business is one that necessitates the keeping of records on a daily basis and a separate set of books on each operating unit. At each month end, we are required to make profit and loss statements and trial balances on each. We also make combined balance sheets and profit and loss statements by divisions. During certain periods of our fiscal year, we are also required to make consolidated reports of our entire operations. The normal period required for our monthly closings is approximately five days after receiving our last day's report.

Equipment; Source Data

Our entire accounting system is built around the IBM 305 RAMAC. This is a random access, in-line processing accounting machine. It consists of an inquiry station, console, disk file, processing unit, card punch and printer. The input is punched cards and the output either printing or punched cards, or both simultaneously. In addition, we have the following off-line equipment:

407	Accounting machine
514	Reproducing punch
077	Collator
083	Sorter
024	Keypunches (3)
056	Verifiers (2)

Some of the above equipment is not necessary in the general ledger accounting application. However, we do utilize portions of it to speed up our operation, since it is required to do certain other jobs not economically feasible for the RAMAC.

As there is a great variation in the manner that source data is received in different companies, this portion of

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our procedure may be less helpful generally. We shall touch only lightly on this subject. We receive our source data in daily reports. Each contains a cash report on which cash receipts and expenditures are recorded, receiving sheets with supporting invoices for credit purchases, and a food cost report serviceable for analysis and statistics. Journal entries and checks are entered in the central office on a form on the back of the cash report. An accounting clerk verifies and codes all the source data for the machine accounting department, giving it a control total of the debits and credits, against which to balance. The control total is important because it is used to make sure that none of the daily transaction registers is incomplete and that none of the journal entries is one-sided.

How the Entry Information Is Stored

The general ledger accounts and balances are stored on magnetic disks in the disk storage memory file, along with various other codes and information used for control purposes. The disk storage is organized into 50,000 100-character records. Each operating unit's ledger requires 230 accounts, with a 100-character record for each. The accounts are numbered consecutively from 1 through 230. Accounts 1 through 167 contain the balance sheet information, and 168 through 230 the profit and loss accounts.

Our General Ledger Master Account Record is illustrated in Exhibit 1. It will be noted that this record is divided into fields and that these fields have definite locations on the master record. This enables the RAMAC to

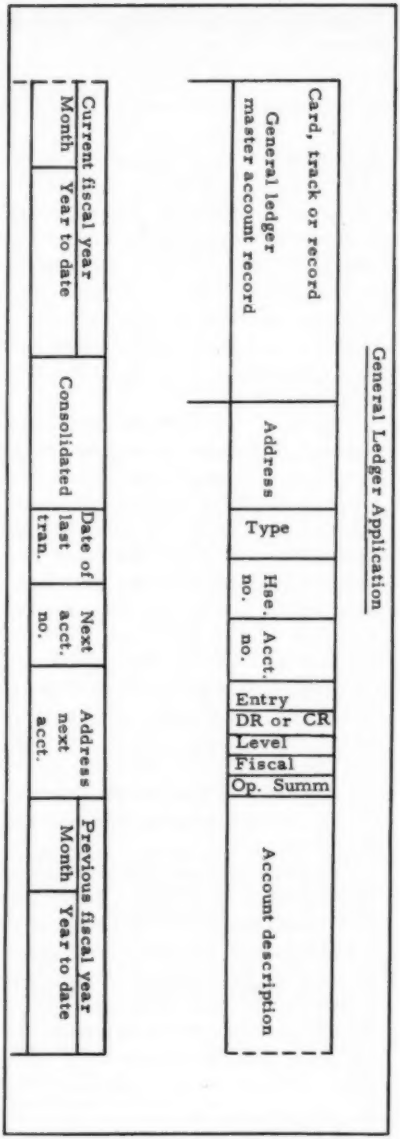

EXHIBIT 1

locate the desired information for its use in processing transactions. The fields on the record are used for the following purposes in our application:

Address field—5 characters. Contains the address, i.e., location of the account in disk storage file.

Type and house number field—3 characters. Used to classify the type of operation, such as cafeteria or restaurant, and is also used to keep the individual units separate.

Entry field—1 character. A control code to separate subsidiary from control accounts. It is always desirable to update accounts down to the lowest level to keep control accounts in balance with the subsidiaries.

Debit and credit field—1 character. A code used to control the selection of the arithmetical operation, i.e., addition or subtraction of an entry. It also indicates the normal condition of the account, whether it should be a debit or credit balance. Errors in coding and updating can be highlighted by indicating on the output any appearance that the account was in abnormal condition.

Level field—1 character. A control code used to differentiate balance sheet accounts from profit and loss accounts. It also controls the addition and subtraction in the printing of the profit and loss statement.

Fiscal year field—1 character. Used to blank (clear) the year-to-date field at the unit's year end.

Operating summary field—1 character. Used to blank the current month field of the profit and loss accounts at the end of each month.

Account description field—23 characters. Contains the alphabetic description of the account.

Current-fiscal-year field—19 characters. Contains the balances of the account for the current month and year to date.

Consolidated field—10 characters. Balance of the account for the parent company's year. This is necessary because the parent company's fiscal year differs from each individual unit's.

Date-of-last transaction field — 5 characters. The date on which the account was last affected by operation of the machine. This is very important for audit trail purposes.

Next-account-number field—3 characters. Used at the month end to speed up processing.

Address-next-account field—5 characters. The disk address of the next account. The field is also used to increase the speed of the month-end "pull down."

Previous-fiscal-year field—19 characters. The same information as the current-fiscal-year field but for the prior year for comparisons.

With these fields, the general ledger master record contains all the information necessary to control almost every condition that affects the updating of general ledger accounts and the printing of monthly statements. The flexibility that the 305 RAMAC has to handle general ledger accounting is readily apparent.

Daily Processing

Upon receipt of the daily report in the machine accounting department, the information is punched into cards and the punching is verified. The cards are run through the RAMAC for "proofing." During the proof routine,

Daily Transaction Register

Acct. no.	Trans. class	Account name	Amount Debit	Amount Credit	Balance	Date last transaction Mo.	Day	Yr.
4	CA	First National Bank	1,140.54		21,881.99	1	11	1
4	CK	First National Bank		576.32	21,305.67	1	12	1
15	CA	Sou. Bell Tel & Tel	19.05		174.91	1	11	1
16	CA	Buena Vista Hotel	19.57		864.91	1	11	1
		Bal	3,145.75	3,145.75				
		A/Pay						
169	CA	Customers	15.15		156.37	1	11	1

EXHIBIT 2

the machine checks the cards with the disk file to verify that there is a house number and account number, as punched into each card, and that the account designated is an entry-level account for each of these transactions. The step also includes totaling the debits and credits to see that they balance. These totals are printed out to check against the total on the cash report. Any reports that do not balance are sent back to the accounting department for correction.

The next step is the actual updating of the disk file by running the cards through the machine for entry in the file. At the same time, we print a Daily Transaction Register (Exhibit 2) and punch out a duplicate set of account payable cards for the accounts payable file. This duplicate set of cards enables us to keep a complete record, external to the machine, of each day's transactions, in case it is necessary to reconstruct our ledger. The printing and punching does not slow up the processing, as it is done simultaneously with the updating. (Also at this time, we can type out at the inquiry station any exceptional situations which require adjustment, such as overdrawn bank accounts, etc. However, this causes an "interlock" and slows up processing.) As may be noted from the exhibit, the transaction register, which is kept by daily sheets in a binder for each unit, contains the following additional information:

Transaction class. An alphabetic code indicating the source document from which the entry was derived, e.g., CK for check, PR for payroll register.

Amount. Debit and credit. The numerical amount of the entry.

Balance. This is the balance of the account after the entry has been recorded.

Date of last transaction. For audit trail purposes.

Account negative. This is used to show that the account balance is contrary to its normal status and, therefore, should be checked for correctness.

Trial Balance

Acct. No.	Account name	Amount Debit	Amount Credit	Amount Balance	Date last transaction Mo.	Day	Yr.
3	Cash	30,378.88			1	31	1
4	First National Bank			11,348.79	1	31	1
5	Dep. Guaranty Bk. Tr. Co.			11,516.59	1	31	1
7	Change fund			850.00	12	31	8
8	Employees loan fund			150.00	12	31	8
9	Rent account			6,513.50	1	18	1
11	Accounts rec. other	3,353.35			1	31	1
12	Meal tickets			5.83	11	21	0
14	Misc. accts. receivable			2,495.41	1	29	1
15	California Oil Co.			337.31	1	31	1
16	Gulf Oil Co.			514.80	1	31	1

EXHIBIT 3

Month-End Closing

After updating the last day's report, we are ready to make our end-of-the-month accrual entries. In fact, we make as many of them as possible at some date during the month. Examples are insurance, depreciation, taxes, etc. However, there are some accounts that we are unable to accrue until the entire month's business is recorded. Among these are percentage rents, payroll taxes, administrative charges, etc. The machine accounting department furnishes the accounting supervisor with a list of the balances in these pertinent accounts. This is done by means of a special search routine. The supervisor computes his accruals from the information on this list and enters them on a closing sheet form.

After updating the disks for the closing entries, we are ready to print our end-of-the-month trial balances and profit and loss statements. This is done by a special program designed to punch out all accounts that have balances. They are punched out at the rate of 100 cards per minute. The balance sheet accounts are separated from the profit and loss accounts. We are ready to print an individual Trial Balance (Exhibit 3) and Profit and Loss Statement (Exhibit 4) on our IBM 407 Accounting Machine, which lists at 150 lines per minute. These statements can be run on the RAMAC printer simultaneously with the punch out; however, it takes about an extra minute longer per statement to do so, due to the difference in printer speeds. The punch out is necessary for reconstruction purposes in case of machine failure, so we print the statements on the 407 machine to speed up the processing. Also, by punching out the accounts, we have the ability to make statements of any combination or comparison of units.

After all statements are printed and scrutinized for accuracy, the current-month field of the profit and loss accounts is "blanked" by a special program, so that entries for the new month may be accumulated independently.

The trial balances are printed on the daily transaction forms and filed in the individual ledger binders. The profit

Profit and Loss Statement

	Month		Year to Date	
Customers	39,367		308,683	
Food sales	43,361.93		343,799.96	
Cost of sales	18,645.63		155,664.14	
Gross profit on sales		24,716.30		188,135.82
less: Expense				
Operating & maintenance	13,185.21		86,525.27	
Pay roll	11,646.63		84,032.87	
		24,831.84		170,558.14
Food operating profit		115.54-		17,577.68
Cigar sales	1,050.58		7,241.28	
Cigar cost	793.19		5,347.87	
Cigar profit		257.39		1,893.41
Other income		231.24		661.50
Total operating profit		373.09		20,132.59
Operating maint. expense				
Stationery		59.92		845.57
Service contracts		466.76		3,689.61
Noncontrollable				
Advertising	455.87		3,790.69	
Donations	100.00		300.00	
Freight			10.91	
Insurance	363.00		2,343.00	
Interest	538.16		1,076.32	
Legal and auditing	25.00		175.00	
Bonus			361.49	
General and adm. expense	2,168.10		17,190.00	
Taxes other	1,134.38-		515.62	
Travel			62.78	
Total noncontrollable		2,515.75		25,825.81
Short and over		68.75		639.55
Depreciation		1,292.78		8,850.66
Rent		4,968.10		19,990.00
Ice				4.12
		13,185.21		86,525.27

EXHIBIT 4

and loss statements are printed on continuous form duplicating masters so that we can make the desired number of copies without retyping. We do not make individual balance sheets for each unit; however, we are required to make several division balance sheets.

A Few Special Entries— But Over-All Efficiency

There are a number of conditions that require special consideration, such as auditors' fiscal-year adjustments on both the individual companies and on the parent company, direct entries to profit and loss, etc. We handle these conditions with special programs and control panels, which can be used only under the supervision of the auditor or the controller. This ensures that all transactions will be handled through regular processing methods and will be recorded on a transaction register.

We feel that the IBM 305 RAMAC has been an immeasurable help to us in cutting the time-lag at the end of the month and freeing our supervisory accountants for audit work to ensure more accurate accounting records.

Truth or Tradition?—The Problem of Current Costs and Comparisons

by L. H. GILLES, JR.*

THE TENDENCY of the accounting profession to ignore the need for changing its methods and also to permit conflicting procedures to remain equally acceptable can seriously damage us in time. If we do not assume the responsibility for defining principles and developing better standards of what is right and what is wrong, we invite others less qualified to do so. Witness the case of government regulation of railroad and public utility accounting.

Financial statements are useful only to the extent that they exhibit current facts, not accounting conventions or historical data. The American public, consumers, labor, investors and prospective investors must be supplied with realistic, truthful and impartial statements of business facts. Yet we hedge at this point. We are on thin ice already. Rather than progress, we have sought academic justification for practices which fail to inform the ordinary man. No deception is intended. However, it is not enough to work within the limitations of our data and expect others to appreciate these limitations; we must develop skill and leadership in surmounting them in our search for truth.

The main shortcoming is failure to use current cost. A good deal of material is being written on this subject nowadays. We can plead ignorance no longer. The path has been illuminated, so why delay? We have made a half-start with "lifo" for inventory valuations, chiefly influenced by the tax law, but have ignored fixed assets. In short, in worrying about whether our surplus is clean or dirty, we have ignored the real villain: unstable dollars. It matters little, when we add apples, pears and peaches, what we label the total. Comparative statements for a single enterprise are meaningless unless they are expressed in constant-value units. This is not merely an academic question. During inflation, firms may be reporting profits when they are worse off at the end of the year than they were at the beginning, and investors may be receiving dividends which purport to be from current income but are actually a partial return of capital.

Accountants have procrastinated. There have been various alibis: Inflation has not been severe; accountants are not interpreters; principles have not been defined; time will straighten it out;[1] the effort is too great. And so it goes. That price-level accounting is too difficult to administer is a weak argument. By applying the Bureau of Labor Statistics Consumer Price Index to historical costs both at the beginning of the period and during the period, several writers have demonstrated simple and logical methods—they balance and reconcile!—to express accounting transactions in the only way that makes sense, *i. e., in terms of purchasing power.*[2]

[1] This point needs emphasis. To correct for understatement of profit of a prior period does not rectify the inequity for an investor who has already sold his stock. It is this feature of short-term ownership that makes periodic profit determination critical in corporate accounting.

[2] See Perry Mason, "Price-Level Changes and Financial Statements," American Accounting Association, 1956; and Richard A. Ridilla, "A Technique to Adjust Financial Statement Data for Changing Price Levels," *The Accounting Review,* October, 1960.

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Now let us move to the more difficult area of inter-company comparisons. Here we find that the acceptance of alternative practices has created a chaos. Because of differing methods of charging such items as depreciation, depletion and intangible development and exploration costs, it is doubtful if twenty out of a hundred oil companies have earnings which could be compared. I would go so far as to say that manipulation of profit figures is sanctioned by the accounting profession under the guise of generally accepted principles. If a large corporation admits that it postponed expensive needed repairs in order to pay dividends, how truthful is its net income figure that purports to embrace the concept of matching costs and revenue?

Some other areas in which alternative acceptable practices can be found are: pension plans, stock options, research and development costs, and income-tax allocation. Although uniformity has unpleasant connotations, it is a practical necessity if we are to protect the small investor, who depends upon audited financial reports for his comparisons, from the advantage held by market insiders.

Where shall we look for leadership? To the SEC? The IRS? The finger must point at the accountant. He is the one with no ax to grind because his prestige depends on truth. He is the one who must safeguard all interests—identified and anonymous alike. The public accountant is foremost here, but this is not to say that industrial accountants have no responsibility. If enough of us add fuel to the fire, surely there will be a conflagration!

Accounting for Payables—A Tabulating Procedure

by ELMER B. FISHER

DISBURSING and accounting for payables through the use of punched cards is a practicable and efficient procedure but exceptions arise which do not lend themselves readily to the method. Foremost is the frequent necessity to issue checks on very short notice for such items as emergency travel advances, taxes, payrolls, etc. A second type of exception is the problem of processing casual or non-recurring purchases. The handling of these exceptions and their integration with the punched card system are covered first in this write-up; the routine for payments to regular suppliers is then described.

Items Requiring "Short-Order" Handling

Checks for the exceptional items which have been identified are typed manually each afternoon or oftener if necessary upon authority of a check requisition, a properly approved bill, or a purchase order.

This pre-numbered check is a three-part snap-out set. One carbon copy is stapled to the authorization and supporting papers and filed alphabetically by payee. The other carbon is used for accounting distribution and ultimately filed in numerical sequence in a binder which serves as a check register. The distribution copies, all numbers having been serially accounted for, are sent to the tabulating department weekly, accompanied by two control tapes, one for the distribution amounts and cash discount, and the other for the net amount of the cash payment. This permits the accounting distribution to be done by tabulating procedures as with regular payments. When it is complete, the distribution copies of these checks are returned to the accounting department, along with a weekly tabulation of cash disbursements. There they are again checked for missing numbers and filed away in numerical sequence.

Regular Invoices: Entries on the "Apron"

The bulk of accounts payable invoices are processed on punched card equipment and checks are mailed on Friday of each week. All invoices to be paid on that day must be in the tabulating department by the evening of the preceding Wednesday. Checks are scheduled to be completed by Thursday evening, allowing Friday for proofreading, signing and stuffing in window envelopes.

Invoices received in the mail room are delivered to the accounting department, where an apron form (Exhibit 1) is scotch-taped to the original. The carbon copy (required by conditions of our purchase order), bill of lading, and any other supporting papers are

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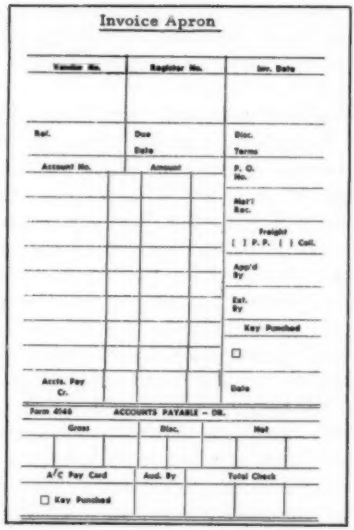
stapled to it. A register number is next stamped on the apron and on the face of the carbon copy. The first two digits indicate the month in which the invoice may be expected to be booked and the next four digits (starting each month with 0001) are used for serial identification.

A vendor's code number is assigned to each invoice from an alphabetic card file. For this the tabulating department maintains a master deck of vendor name and address cards which is revised on written instructions from the accounting department. Extreme accuracy is required in applying the number to the invoice, since it determines the payee of the check. For assistance in this, the tabulating staff periodically provides the accounting staff with a listing of the master deck in numerical sequence. The list serves as a cross reference and aids in setting up new vendor code numbers, to keep them in a rough alphabetical grouping. Incidentally, vendors paid under the exception procedure already described are usually transferred to regular payment after three checks have been drawn to them.

Next come entries in the appropriate blocks on the apron. These include invoice date, discount terms, purchase order number, and due date. Invoices received on Monday are marked as due on Friday of the same week. Invoices received after Monday are marked as due on Friday of the following week. This is the normal cycle for processing. However, any invoices received after Monday which are returned to the accounting department soon enough to permit inclusion in the current week's payment, are so processed.


Invoice Apron

Vendor No. | Register No. | Inv. Date

Rec. | Due Date | Disc. Terms

Account No. | Amount | P. O. No.

Mat'l Rec.

Freight [ ] P.P. [ ] Coll.

App'd By

Ext. By

Key Punched ☐

Accts. Pay Cr. | Date

Form 4148 ACCOUNTS PAYABLE – DR.

Gross | Disc. | Net

A/C Pay Cod | Acct. By | Total Check

☐ Key Punched

EXHIBIT 1

Action in the Purchasing Department

The invoices go to the purchasing department where they are stamped with the current date, sorted as to the type of purchase (raw material, purchased parts, or supplies and equipment) and distributed to the buyer responsible for the procurement of each category. Under his direction the following steps are taken. Each invoice is matched with the corresponding purchase order. The carbon copy and all supporting papers are stapled to the purchase order. The order is matched against receiving reports on hand and, if the material is in and the quantities agree, the date received is entered on the invoice apron and the receiving report is attached to the purchase order.

If the material has not been received, the invoice is processed but the purchase order is held in an open file until the receiving report comes in and is verified against the copy of the invoice. At this time, the purchase order and supporting documents are transferred to the closed file. There are exceptions to this immediate processing of invoices where material has not been received. Such exceptions relate chiefly to vendors from whom we buy infrequently. In these cases, we cannot be certain of having subsequent purchases against which we can offset claims for shortages, defective materials, etc. Other exceptions are material purchased on trial and acquisition of equipment, payment for which is contingent upon satisfactory performance.

It is part of the responsibility of the purchasing department to verify the catalog number and price of materials. Any errors in price or quantity are corrected by issuing a purchase debit charging the vendor. These debits are registered and processed in the same manner as invoices. Such changes may also be made for defective material which does not pass inspection. Quantity shown on receiving slip is the quantity shown on vendor's packing list. The actual count is verified when inspection takes place. The purchasing department is notified of discrepancies.

Before the invoices leave the purchasing department, the account number to be charged is written on the apron. This number is obtained from the purchase order where it has been typed from the following sources:

Raw material and purchased parts—from schedules prepared by the planning department.

Factory supplies inventory—from requisitions originated by the cost department, which is responsible for the control of factory supplies inventories.

Office supplies inventory—from requisitions originated by the office service department.

All other purchases—from requisitions originated by the foreman or other authorized personnel. All such requisitions are first sent to the accounting department where they are screened and approved as to proper charge numbers.

Invoices for raw material require a code number as well as an account number. This code has been typed on the purchase order from the planning schedule. The quantity invoiced is circled in pencil so that the tabulating department can match the code with a master raw material cost card and extend quantity by price to develop a standard charge to inventory and a raw material variance which appears on the monthly listing of the accounts payable distribution. (Exhibit 2).

On invoices for purchased parts, the purchasing staff circles both the catalog number and the quantity invoiced. These are extended in the tabulating department in the same manner as for raw material.

A weekly listing of these inventory items is furnished to the cost department for analysis of unusual variances and to the estimating department for its guidance as to cost trends.

Invoices covering factory supplies inventories are sent to the cost department. Here the prices and quantity received are audited against the purchase order and actual unit prices recorded on a vendor record card. Sup-

ply invoices are then handled in the same manner as those for purchased parts above. The tabulating department maintains a perpetual inventory of each item and submits weekly to the cost department a listing of items the balance of which is down to a predetermined order point.

Each month a listing of supplies usage, by department charged, is furnished each department head. A tabulation is prepared, also, showing the accounting distribution and the inventory accounts relieved for the month's usage. This is the basis of a standard journal entry.

When freight charges are included on the invoice, the appropriate account number is also written on the apron. As a final step, the "App'd By" bloc is initialed.

Calculation and Distribution of Invoices

In the accounting department, the invoices which have been processed through the purchasing department are separated into two groups for purposes of control. One group consists of the inventory items on which standards will be computed by the tabulating unit. After verifying the extensions and additions of the invoices and computing the cash discount, if any, the dollar amount is entered on the apron. The amount charged for material is entered opposite the inventory account number, except freight which is listed opposite the appropriate account. The amounts are totaled and entered in the "Gross" block. The "Disc." and "Net" blocks are then completed and the "Ext. By" block is initialed.

Any invoices which do not have a

ACCOUNTS PAYABLE DISTRIBUTION

RANCO INC.
COLUMBUS, OHIO

FEB 28•1961

VENDOR NO.	REC. NO.	INVOICE DATE	MATERIAL CODE	QUANTITY	VARIANCE $	ACCOUNT NUMBER	AMOUNT (STANDARD COST)	% VARIANCE
1167	21056	2 07 61	58278002	308-		1521	150 92-	
1167	21645	2 15 61	58278002	541	2164	1521	265 09	8
1167	21765	2 15 61	58278002	1109	4436	1521	543 41	8
5629	20328	1 31 61	58364002	28710	287	1521	77 52	4
6167	22012	2 23 61	58540001	55000		1521	330 00	
6167	22013	2 23 61	58540001	55000	134061-	1521	330 00	
				8921576		65	548 21	

EXHIBIT 2

vendor number are now pulled out to be paid by the method set forth at the start of this article. Four control tapes are run on the others as follows:

Quantity
Gross Amount
Discount and net amount
Distribution*

Processing the second group of invoices differs only in specific respects. For example some purchases may be subject to state sales or use taxes. It is the responsibility of the purchasing department to stamp all such invoices "subject to state sales tax." When the vendor fails to bill such taxes, they are accrued directly from the invoice, with a credit to state use taxes accrued and a charge to a similarly designated cost account applying to the material. The amounts so accrued are immediately entered on a worksheet which is the basis for the quarterly use tax return. Invoices for office supplies inventory are routed to the office service department where they are hand-posted to a perpetual inventory ledger and then returned to the accounting department. Invoices charged to equipment and tool orders are routed to the property accountant for verification of the validity of the charges and for noting on his check list, used to determine activity on open equipment and tool orders for purposes of closing. No quantity tape is run on this group.

Both batches of invoices then go to the audit desk where they are screened for correctness of charge numbers and a cash disbursements code number is entered in the "Date" block. This number will ultimately result in a weekly cash disbursements analysis, used to forecast cash requirements. The code numbers represent the following classifications:

Code	*Item*
1.	Raw materials
2.	Purchased parts
3.	Freight and express
4.	Factory labor
5.	Office salaries
6.	Supplies and expense—factory
7.	Supplies and expense—office
8.	Travel expense
9.	Taxes—all
10.	Capital additions
11.	Professional fees and prepaid and deferred expense
12.	All other (dividends, long-term debt, transfers, etc.)
13.	Commissions

The invoices are then taken to the tabulating department where a batch number is assigned to each group. This number is punched into each card and the cards for each batch, when punched, are balanced against the control tapes. Two tabulating cards are punched for each invoice. A distribution card is used to collect charges to the various accounts. The distribution cards result in the information listed on the Accounts Payable Distribution (Exhibit 2) monthly by account, showing vendor number, register number and date of invoice. They are then summarized into a general ledger card for each account in which there is activity.

Writing and Verifying the Checks

A tabulating card is used to write the check. After all invoice batches for the week have been balanced, they are combined with unused check cards

* The total of the amounts opposite "Acct. No."

from the previous week (representing purchase debits in excess of invoices), then sorted and tabulated by vendor number. At this point, cards for any vendor having a credit total are hand-pulled and held for the succeeding week. A listing of these cards is run on the check register form.

The remaining cards are matched with the master deck of vendor name and address cards and a check register (Exhibit 3) is run. The same cards are then used to write the checks. When the last check is written, a machine total is pulled off on a check register form, which must agree with the total of the check register.

Since the total of the checks issued has been balanced against the control, the total disbursement for the week has been verified. The only other possibilities for error are the assigning or punching of incorrect vendor numbers or the failure of the tabulating equipment to take a total at the end of each vendor number listed.

The invoices covered by the checks just written have been previously returned from the tabulating to the accounting department where they have been sorted by vendor. The payee's name and address as they appear on the invoice are visually compared to a carbon copy of the check including the remittance advice stub. The number of invoices is also compared to the number listed on the remittance advice. At the same time, the total of the remittance advice is visually compared to the amount of the check. (At first, this audit was done by using the check register but so few errors were found that we do not hold up check preparation to complete it.) The paid invoices are then stapled to

CHECK REGISTER

KANCO INC.
COLUMBUS, OHIO

Date

FORM #183

VENDOR NO.	REG. NO.	INVOICE DATE	GROSS AMOUNT	DEDUCTIONS	DISCOUNT	P.O. NO. OR DIST. CODE	NET AMOUNT	CHECK NO.

EXHIBIT 3

the carbon copy of the check and filed away by vendor number.

When all invoices have been matched to check copies, the checks are signed, stuffed and mailed. Some minor exceptions occur at this point. For one thing, there will be more invoices than can be listed on the remittance advice for some vendors. This is determined in the tabulating department by sight-checking. These cards are pulled out and a total card punched from the check register; only the total is printed on the remittance advice. A separate listing of the invoices is made on a check register form and enclosed with the check. Another exception concerns purchase debits. Vendor's copies, in duplicate, of all purchase debits are sent to the accounting department instead of being mailed at time of issue. If any are deducted on the current week's payment, both copies are enclosed with the check. The original copies of those unused are mailed on Friday to the vendor. The other copy is held with our file copy to be enclosed with our check when the debits are eventually applied on a payment.

Statements received from vendors are not utilized unless they show overdue items. These are always investigated.

Minimum Time, Maximum Data

This procedure for paying invoices weekly through a systematic tabulating routine has eliminated a very heavy clerical load previously required to compute price standards and variances on each of approximately 5,000 items of material, as well as to distribute them and many more miscellaneous items to the proper accounts. A variety of useful data is obtainable at the expenditure of a relatively small amount of tabulating machine time. Some examples are: weekly variance reports, weekly analysis of cash disbursements, and the accumulation of data to facilitate the accurate setting of price standards. Another is an annual tabulation showing the volume of purchases from each vendor. This is very helpful to the purchasing department.

The system has operated with a negligible percentage of error and without appreciable pressure in meeting the weekly deadline.

Cost Standards—On What Basis?

by F. J. McLAUGHLIN, JR.*

THE MANAGEMENT INFORMATION generated by the camparison of actual costs versus approved standard costs can highlight those elements of the operation needing attention provided the standards themselves have been carefully set. This situation is particularly true in industries which use plant capacity as the volume basis of their standard costs.

* Director, Administrative Service, The Chemstrand Corporation, Decatur, Alabama.

Where machine capacity is determined as the volume basis for standard cost development, two divergent approaches can be taken in the standards formulation. First, standards can be set for the total plant capacity, with the capacity being determined by the "bottleneck" operation. Secondly, standards can be set based on the capacity of the individual operational segments which comprise the whole manufacturing unit.

The implications of these two approaches are not to be taken lightly. Operating management (production managers and superintendents) tend to favor the over-all capacity standard with the bottleneck operation determining total output. In their opinion, this method provides a realistic basis of measurement which is geared to the over-all output they can produce under standard conditions. The consequent analysis of variances from such standards is more easily understood by the production people and their subordinates. The complexities of accounting techniques may usually be avoided in preparing and presenting the variance analysis.

On the other hand, many top-level executives (presidents and general managers) tend to favor cost standards built on the capacity of the individual segments of a given operating unit. Standards devised on this basis highlight imbalances in the manufacturing operation and provide excellent economic tools when alternative methods of operation are being studied or there is a possibility of sale of semifinished products. Similarly, such standards are extremely valuable when production expansion is being considered because they point out effectively the cost implications of facilities expansion.

In industries using plant or machine capacity as the volume basis of manufacturing cost standards, the respective accounting managers should strive to select the one which will do the given operation better service. The production manager should have as much voice as the top-level executive in the formulation of standards. The fact cannot be ignored that, in most instances, the effectiveness of the production manager is judged on the basis of his actual cost of production as compared with the standard. Under these circumstances, a standard based on over-all plant capacity seems the most practical for the production manager. It avoids extremely complex variance analysis and provides a yardstick for comparison, which reflects the conditions he faces in day-to-day operations. The interlocking capacity differences within the over-all operation are not a complication factor, since the bottleneck determines over-all standard plant capacity.

It should be kept in mind, however, that in cases where imbalances between the capacities of the operational units are not clearly set out in the volume basis of the cost standards, top management may miss opportunities to use individual excess capacities for other purposes. Granted that the over-all analysis of variances is more complex and difficult to understand and that at the same time variances may be very high because of low actual volume versus standard capacity in some of the operating segments, the individual unit capacity for setting the volume basis for standard costs has much to offer.

Companies using the plant or machine capacity volume basis for their cost standards might examine the facts surrounding their operation. The accounting managers should evaluate which condition is paramount to their standards as management decision tools—over-all plant capacity or individul operating unit capacity.

Coding Branch Statements for Fast Transmission

by H. K. DONALDSON*

THE INCREASING TEMPO of modern business has accountants and systems experts diligently searching for methods of providing management with reliable operating data at an earlier date. Timeliness in reporting has assumed as great an importance as the reporting itself. This is particularly true in corporations with a wide geographical dispersion of branches, divisions or subsidiaries. Transmittal time frequently seems to be an insurmountable bottleneck in gathering information for summarization or consolidation.

Most companies with widespread interests utilize some form of wire service for rapid transmission of messages, but, in too many cases, the possibilities of using leased wire facilities or TWX for reporting financial data are ignored. In some instances, the data may be of such a confidential nature that delay in transmission is preferable to having figures accessible to too many people. However, by the simple expedient of using preestablished category codes, both balance sheet and profit and loss may be transmitted by wire in minimum time, with minimum detail and effort and without being exposed to unauthorized personnel.

It is helpful, in this connection, but not entirely necessary, to have a standard chart of accounts under which all branches, divisions and subsidiaries operate. The key to success in condensed, coded reporting is to set up a numerical code for each caption on the respective reports and to educate field personnel to make all possible reclassifications of the figures at their source. The codes really represent a condensed chart of accounts and can cover a full range of reporting. For example, a typical balance sheet might be coded as follows:

Code No.	*Classification*	*Code No.*	*Classification*
01	Cash	20	Other assets
02	Marketable securities	30	Notes payable
03	Accounts receivable	31	Accounts payable
04	Notes receivable	32	Accrued compensation
05	Raw material and supplies	33	Accrued taxes
06	Finished products	34	Other accrued liabilities
07	Prepaid and deferred charges	40	Interplant, interdivision or intercompany accounts
10	Land		
11	Plant, property and equipment	50	Capital stock
12	Accumulated provision for depreciation	51	Earned surplus (or year-to-date profit or loss)

The condensed statement of profit and loss would then look something like this:

Code No.	*Classification*	*Code No.*	*Classification*
60	Net customer sales	85	General and administrative expense
70	Cost of goods sold	90	Profit or (Loss)
80	Selling and advertising expense		

This simple device has speeded up the submission of summary reports to executive management by as much as two or three days, without any advancement of cutoff dates in the field. It is designed and recommended for interim reporting only and can be adapted to any type of recurring report.

* General Accounting Controller, Rheem Manufacturing Co., Richmond, California.

Centralized Control of Multiplant Operation—Some Benefits

by DAVID E. HENDERSON*

FIFTEEN YEARS AGO the cachet (for then) of alert, aggressive management policy was, "let the man on the spot make the decisions," meaning that the branch managers in a multiplant company should have the highest degree of autonomy possible. Such a series of loosely controlled operations was "decentralized" management and, as such, had a large following. However, from the controller's viewpoint, this led to some rather bizarre situations. As one example, it was possible for Plant A to buy the same components outside the company that were made by Plant B, because they were cheaper. Although Plant A might show more profit this way, the over-all effect on the company could well be a loss.

For this and other reasons, the last decade has seen the pendulum swing from decentralization to centralization in many multiplant organizations. The distinction between centralization and decentralization can perhaps be best explained by illustration. Take as an example a company with ten or a dozen plants in as many towns. In the centralized company, there would be strong staff support from the home office. Many of the functions like payroll accounts receivable, advertising and inventory control would be handled at the home office. Quite possibly the sales force and the engineering group would also operate out of the home office. Contrast this with the decentralized operation. In many respects, it is a "little kingdom." Every facet of the business operation, with the exception of a very few like the payment of dividends, perhaps, or the handling of patent work, is in evidence at each location. There is a small accounting department, an accounts receivable ledger or two, and someone who spends part time in placing advertising.

To consider centralization and decentralization from yet another viewpoint, centralization is a vertical organization while decentralization is a horizontal one. In the latter, a plant manager must become expert in a great number of things, each in small volume. In the former, he is relieved of a great deal of miscellaneous work and can concentrate on the main chance. He becomes a specialist. Here we have one of the principal arguments for centralization. If the plant manager is relieved of many executive duties and, therefore, the necessity of making related decisions, the plant can be operated by a less gifted and, therefore, lower salaried individual. This same principle holds true at any level of management or of clerical or factory work. Although companies like to think that their personnel selection and administration is so astute that it results in high caliber employees who give it an edge over like concerns, this is not so except in a few highly specialized fields. By and large, any big company has to operate with a cross section of the business population.

The chief advantages of centralization seem to be these:

1. Operating costs are lowered. As already indicated, lower-salaried employees handle the job if major decisions are made for them. The "one best way"

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is determined centrally. This results in a more efficient, more profitable way of doing business. Operating costs are also lowered through volume. In the accounting services field alone, centralized accounting, billing or receivables make for economy through the efficiencies possible in processing large quantities.

2. Improved accuracy or quality results. Again, an expert group can more effectively determine controls for a better product than when the job is split into a dozen parts.
3. Better service to the customer and within the organization itself comes about, much like the improvement in accuracy or quality. Instead of a patchwork of systems which need final correlating and adjustment at the home office level, an integrated plan can be worked out for the entire organization. It can be designed centrally and administered locally. Any accountant who has put together a corporate statement from a considerable number of individually designed plant statements will see merit in this.
4. Decisions are uniform and company policy more easily maintained. A profitable operation in one plant is apparent at the home office because it can be compared with a like combination at other plants. The same operation can be extended to all. This is an unlikely situation in a collection of "little kingdoms."

Of course, it is possible to level many criticisms at centralization. A good executive training ground is eliminated. (But not every one of, say, ten branch managers is going to be company president; decentralize two or three branches if there is no other way to train them.) Interruption of operation at the main plant can dislocate the whole company. (Yet, how many times does this happen?) "Out-of-the-ordinary" decisions must be "bucked up" to the home office, with consequent slowing down of determinations. (At the worst, expert opinion is as near as the telephone.)

The foregoing are illustrative, with the rejoinders which come to mind. Centralization seeks to outweigh these defects through providing better goods or services at lower costs in the most efficient way. It is the same philosophy which dictates assembly lines in the factory.

This is a situation in which the controller's viewpoint is important and should be made available within management.

Beyond These Covers

Books

Report Writing for Business

Raymond V. Lesikar, Richard D. Irwin, Inc., Homewood, Illinois, 1961, 337 pp., $9.25.

That, nowadays, a strong element of research—sometimes a predominating element—must enter into all reporting is recognized in this text which, however, does not scant the central problem of the organization and writing of the report itself. The use of graphs has a chapter to itself. A seven-page report check list closes the text.

Cost Reduction Guide

H. Clifton Morse and E. E. Wyatt, Wyatt & Morse, Inc., 332 South Michigan Ave., Chicago 4, Illinois, 1961, 244 pp., $18.

"Written for manufacturers challenged by rising costs, changing markets and foreign competition," this presentation explains the development and use of a cost reduction program and supplies six "case histories in cost reduction"—each related to a particular problem but centering in three cases on inventory. A substantial final section offers particulars of a comprehensive step-by-step plan for an "operations analysis audit" covering the company's administration, financial control, engineering, manufacturing and marketing functions.

Contributions of Four Accounting Pioneers

James Don Edwards and Roland F. Salmonson, Editors, Bureau of Business and Economic Research, Michigan State University, East Lansing, Michigan, 1961, 238 pp., $6.50.

Selected writings of Eric L. Kohler, A. C. Littleton, George O. May and William A. Paton in the form of numerous brief "summaries of periodical writings" from the works of each, make up this book. It is apparently intended to serve in part as an introduction to the articles summarized, which may be reached by referring from the passages given to the articles themselves, for which source is identified.

Governmental Accounting

R. M. Mikesell and Leon E. Hay, Richard D. Irwin, Inc., Homewood, Illinois. Third Edition, 1961, 741 pp., $11.35.

The enterprise as well as institutional operations of government are treated in this volume, a revision of a text issued in 1951 and first revised in 1956. Among topics dealt with are sinking funds, property tax accounting, and "unit cost accounting for government," as well as accounting problems of educational institutions and hospitals.

A Study of Management Services by C.P.A.'s

James E. Redfield, Bureau of Business Research, University of Texas, Austin, Texas, 1961, 153 pp. $4.25.

This contribution to portrayal of the share which public accountants may play in the growth of management accounting, is largely historical and statistical in character, the latter as to extent and approach of firms to practice in this area. A "management services questionnaire" is one of seven appendices relating to conduct of such practice.

1960 Statement Studies

Robert Morris Associates, Philadelphia National Bank Building, Philadelphia 7, Pennsylvania, Paper Bound, 239 pp., $10.

This compilation from financial statements

contains individual "study sheets" on 175 lines of business, each sheet supplying (with number of statements on which the figures are based) percentage relationships among assets and liabilities and, for income statements, percentages of cost and profit to sales. Following these, in each case, some dozen financial statement ratios are shown. The sheets are columnized to give separate figures for businesses of varying size groups.

Lilly Digest — 1960

Fred C. Hecker, Editor, Eli Lilly and Company, Indianapolis 6, Indiana, Paper Bound, 55 pp.

Numerous analyses of drug store operations by size groups are included in this study together with textual analyses of factors affecting the profitability of these operations. The underlying information was obtained from income and expense statements submitted by or for individual stores.

Management Models and Industrial Applications of Linear Programming —Vol. I.

A. Charnes and W. W. Cooper, John Wiley & Sons, Inc., 440 Park Ave. South, New York 16, N. Y., 1961, 471 pp., $11.75.

Deep in mathematics (to which a portion, at least, of accountants perhaps should begin to devote themselves), this text is not unrelated to problems which are frequently met by accountants. For example, in Chapter IX considering "delegation models," we come upon the "design" of transfer prices.

New Concepts in Manufacturing Management

American Management Association, 1515 Broadway, New York 36, N. Y., Paper Bound, 1961, 172 pp., $4.50.

There are three contributions in this group of papers, designated as A. M. A. Management Report No. 60, which deal with "first-line manufacturing cost control." Each one is a case study, the companies represented being Walker Manufacturing Co., International Harvester Co. and Minneapolis-Honeywell Regulator Co. There is likewise a paper entitled "Data-Phone Ordering: A New Concept of Order Entry and Flow."

Thinking Machines

Irving Adler, The John Day Co., 62 West 45th Street, New York, N. Y., 1961, 189 pp., $4.

Subtitled "a layman's introduction to logic, Boolean algebra and computers," the present book is written for the understanding of the uninitiated, and contains such chapters as those entitled "Getting an Idiot to Think," "Algebra and Numbers," "Algebra of Propositions," "Electronic Computers," and "Thinking Machines on the Brain." A short bibliography for more advanced reading is included.

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